Media Focus, Executive Turnover, and Female Leadership*

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Abstract

I study whether the tendency of news media to focus on negative events affects executive turnover in publicly listed firms in the U.S., and to what extent negative media focus explains the higher incidence of turnover for women in top executive roles. Linking CEO positions to firm-level news, I provide evidence that the negative focus is higher when a company is led by a woman or an outsider CEO, and that negative news are highly predictive of executive turnover. From the standpoint of a rational board, negative media focus may decrease the expected benefit of retaining a CEO, thus increasing the chances of replacement. Counterfactual simulations from a model of executive turnover with event-dependent media focus show that the higher negative focus explains around 15% of the differential turnover rate in female-led firms, even when women are as effective at managing the firm as their male counterparts.

JEL classification: G3, J63, M51

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1 Introduction

Women are underrepresented in leadership positions. As of 2017, women held 19.9% of board seats in Fortune 500 companies and covered 5.8% of CEO positions in the same companies. Even when they do make it to the top, women tend to face more unstable appointments (Gayle et al., 2012; Gupta et al., 2020; Keller et al., 2020). In public companies in the U.S., women in executive positions leave the firm or are replaced at a higher rate than similar men, even when the company is thriving (Keller et al., 2020; Gupta et al., 2020). The general lack of diversity in corporate leadership may come with costs for society as a whole. If talent is equally distributed across groups in the population, narrowing the talent pool may lead to lower economic growth (Hsieh et al., 2019).

This paper asks whether editorial decisions made by news media affect executive replacement in U.S. companies, and to what extent such phenomenon explains the higher incidence of turnover for women in executive roles. My paper focuses on the particular case of Chief Executive Officers (CEOs). There are reasons to expect news coverage to matter for how CEOs are retained and replaced. In the short run, news coverage can affect stock price performance. In the long run, it can affect consumer demand and the firm's ability to attract and retain workers (Graf-Vlachy et al., 2020). Previous research shows that the appointment of a female CEO receives much larger media attention than the appointment of a male CEO (Gaughan and Smith, 2016). Can such higher degree of public attention play any role towards explaining the relative instability of female appointments in highly visible positions?

A company's CEO is at the top of the corporate hierarchy and the main responsible of firm performance. Previous literature finds that female CEOs are more likely to be replaced than their male counterparts, but the difference is not explained by firm performance (Gupta et al., 2020). In the literature, the link between firm performance and managerial turnover is well established. Prolonged periods of low performance provide a signal of low managerial ability, leading the board to replace the company's CEO (Weisbach, 1988; Gibbons and Murphy, 1990; Murphy, 1999; Taylor, 2010; Jenter and Lewellen, 2019). In my paper, news media act as information intermediaries that monitor firm performance and disseminate information to the public (Nimark and Pitschner, 2019). While boards learn CEO ability over time by relying on actual firm performance, news coverage can influence public beliefs on CEO ability. If public beliefs matter to the board, differences in turnover can arise from differences in news coverage.

I show that news media tend to focus on *negative* performance events. In the long run,

such systematic negative focus can produce downward-biased public beliefs on the ability of a CEO. If the performance of a particular CEO – a female CEO – is more newsworthy, a negative news on a female CEO will be more likely to be covered. Over time, public beliefs on the ability of a female CEO can become more pessimistic relative to the case of a less-covered CEO, even for the same realized performance. To offset the bias in public beliefs, the board may require female CEOs to be of higher ability than their male counterparts, and higher turnover rates can arise for equally qualified female CEOs.

Making quantitative statements on the importance of systematic coverage decisions for executive replacement is challenging. News coverage tends to increase in times of worse firm performance. At any given point in time, turnover decisions depend on past realized firm performance and past news coverage, and the two are not independent from one another. Given such complications, I impose structure on the relationship between firm performance, news coverage, and turnover, and complement the use of reduced form methods with a structural approach.

I start by showing empirical patterns of news coverage, and evidence on the importance of news for CEO replacement. I link firm-level financial news from RavenPack News Analytics to public firms in Compustat and executive positions in BoardEx over the period 2000-2017. I aggregate news data at the news event level, and construct a measure of coverage for each news event. A news event corresponds to a particular happening reported in news media. Coverage for a news event is measured as the number of articles it generates. I document coverage patterns at the news event level, a strategy motivated by the nature of firm-level media coverage. News events are often disclosed by the company itself. Documenting media coverage at the news event level mitigates the risk of confounding media choices with firms' choices. The strategy is also motivated by the online nature of firm-level news: online news move fast, and for the same news event there is little variation in content across outlets (Cagé et al., 2019).

Two key facts on firm-level media coverage turn out to be relevant. First, a news event with negative sentiment receives more coverage relative to a positive event. The result points to the existence of a negative selection bias in news media, a finding in line with empirical regularities of media behavior (Harrington, 1989; Soroka, 2012; Harcup and O'Neill, 2017). Second, the severity of the negative selection bias is related to the identity of the firm's leadership. A news event with negative sentiment receives 33% more coverage when a firm is led by a female CEO. The differential is not explained by firm performance, nor by systematic differences across firms. Previous research finds that the appointment of a female CEO

attracts more media attention relative to the appointment of an average CEO (Gaughan and Smith, 2016). I provide evidence that female-led firms receive more coverage throughout the entirety of the CEO appointment. And because news coverage is mostly negative, the difference is driven by negative events. I argue that such differential treatment in the media is related to women's outsider status in the executive labor market.

Executives are a highly homogeneous group, and entry barriers in the occupation are high (Terviö, 2009). Given their minority status, female CEOs may be perceived as challenging the status quo, and information on their performance may be more valuable to investors. I investigate such possibility by constructing measures that correlate with the outsider status of a CEO. Such measures include, for example, CEOs at their first appointment, CEOs at the beginning of their tenure, and founders. Similarly to women, negative performance events for CEOs with outsider status are more likely to be covered. However, outsider status does not fully account for the female differential, and female outsiders receive more negative coverage than male outsiders.

A key empirical question is whether news coverage matters to the board when making the turnover decision. When evaluating CEO performance, the board is likely to rely on private information not available in news media. However, to the extent that negative news coverage may come with reputational costs, the board may be reluctant to retain an executive who performs poorly in news media. To the best of my knowledge, only Farrell and Whidbee (2002) shows empirically that negative performance news published in the Wall Street Journal are related with the incidence of CEO turnover. I complement the evidence in Farrell and Whidbee (2002) by using news data from a wide range of news outlets, and by looking at the effects of both positive and negative coverage. My empirical strategy exploits variation in the timing of news releases across firms. I find that the number of negative news articles released in a quarter is predictive of an appointment ending the following quarter. The marginal effect of a negative article is sizable, and corresponds to 2.3% relative to the sample mean. Positive news, instead, seem to have no effect.

To better isolate the effect of news releases from other confounders and provide a more transparent test of anticipation effects, I complement the previous strategy with an event study approach. I define a sharp news release shock as a quarter in which the firm experiences a number of negative (positive) performance articles greater than the 95th percentile in the firm-specific distribution. The turnover probability jumps discontinuously at the time of a negative news shock, with no clear pattern of following a positive news shock. The evidence suggests that boards respond to news coverage when making the turnover decision,

and especially negative news, supporting the hypothesis that reputational concerns may be important.

Having established empirical patterns of news coverage and on the importance of news for CEO replacement, I formalize the editorial role of news media in a model of executive turnover. The model provides a tractable framework to link firm performance, media focus, and firms' replacement decisions. The model's tractability makes it possible to take it to the data in a parsimonious way, and quantify the effects of news coverage decisions.

The model features a forward-looking board taking the turnover decision in every period. The key difference with traditional models of managerial turnover – such as Taylor (2010) – is that both the private beliefs of the board and public beliefs matter for the turnover decision. Whereas the board's beliefs rely solely on firm performance, public beliefs are updated using published performance. The mapping between realized and published performance is provided by news media (Nimark, 2014).

In line with the empirical evidence, news media are more likely to publish negative performance information. Over time, the private and public information sets can diverge, and the public can become more pessimistic relative to the board. For the same firm performance, more pessimistic public beliefs lead the board to set a higher ability threshold for the CEO to be retained. The model can explain higher replacement probabilities in female-led firms, which cannot be rationalized by differences in actual firm performance. A clear prediction of the model is that female CEOs will be more positively selected around the time of replacement. The prediction finds support in the data.

I derive two additional testable implications that validate the model. Both implications follow from public learning on the ability of a CEO over time. I show that, conditional on CEO tenure, the turnover probability increases the longer the history of negative coverage for a CEO. Conditional on CEO tenure, a long history of negative coverage also increases the marginal effect of a negative news on the replacement probability.

I then calibrate the model's parameters to quantify how much the bias in news selection contributes towards explaining firms' replacement decisions, and the higher incidence of turnover for female appointments. I set the baseline parameters of the turnover model to match data moments for the sample of male CEOs using simulated method of moments. The key moments pinning down the baseline parameters of the model are the turnover hazard and firm profitability over the first 15 years of CEO tenure.

Using the calibrated parameters, I run two quantitative exercises. First, I remove the negative selection bias, thus making public beliefs aligned with the board's beliefs. Removing

the negative selection bias decreases the incidence of turnover by 9.7%. Second, I feed in the higher negative bias estimated for women in the first part of the paper. Holding everything else constant, negative media focus accounts for around 15% of the average turnover differential measured for female appointments relative to male appointments.

My results show that media focus can represent an important source of distortion for the advancement of women and other minorities in leadership roles. The result can have important policy implications. In Europe and more recently in the U.S., gender quotas have been proposed as a policy to improve female representation in top corporate positions. My results suggest that quotas likely need to be implemented for a long period of time for their beneficial effects to fully arise. As a critical mass of women is reached, the negative focus may become less meaningful, suggesting that in the long run policies mandating equal representation can effectively overcome differential treatment in news media.

Related Literature My paper is at the intersection of several literatures. First, it relates to a large body of research on executive turnover. Several papers analyze executive turnover in relation to firm performance (Weisbach, 1988; Gibbons and Murphy, 1990; Murphy, 1999; Taylor, 2010; Jenter and Lewellen, 2019). Weisbach (1988), Laux (2008), and Kaplan and Minton (2012) study the role of board independence. Fich and White (2003) analyzes board interlocks. Goyal and Park (2002) and Taylor (2010) study the role of CEO entrenchment. In particular, Taylor (2010) is the only paper estimating a structural model of executive turnover, as I also do in my paper.

I contribute to the vast literature on executive turnover by documenting the link between firm performance and news coverage, and formalizing how news coverage affects replacement decisions. The closest paper to mine is Farrell and Whidbee (2002), which studies the effect of earnings news reported in the Wall Street Journal on CEO replacement. In line with my results, Farrell and Whidbee (2002) shows that negative earnings news are predictive of CEO replacement. Differently from Farrell and Whidbee (2002), I document novel evidence on coverage patterns in the financial press, and structurally estimate a model of executive turnover to quantify the consequences of such patterns.

Second, my work relates to the literature on the glass ceiling and the barriers to career advancement that women face in top positions. In the executive labor market, gender differences in pay or career advancement have been widely documented. Bertrand and Hallock (2001), for example, show that the gender gap in executive compensation is due to the higher chance of women to be employed in smaller firms and cover lower-ranked positions.

Albanesi, Olivetti, and Prados (2015) find that the compensation of female executives is more exposed to declines in firm value and less sensitive to increases in firm value than the compensation of similar males. Recent work shows that women in corporate executive roles exit the occupation at higher rates than men (Gayle, Golan, and Miller, 2012), are more likely to be fired (Gupta et al., 2020), and leave the company at higher rates than comparable men (Keller et al., 2020). The evidence in Gupta et al. (2020) shows that, for similar levels of firm performance, women CEOs are more likely to be dismissed. I show that media focus can contribute towards rationalizing the turnover gap: news selection decisions can generate higher turnover rates for female CEOs even when they are as effective at managing the firm as their male counterparts.

My paper is the first one to study the role of media focus to explain the low representation of women in leadership positions. Anedoctally, the idea that women in executive roles may attract public scrutiny is known.[1] The same idea has also been proposed in the corporate finance literature, where the role of media attention is usually analyzed in connection with executive appointment. Gaughan and Smith (2016), for example, shows that the announcement of the appointment of a female CEO receives more than three times higher media attention than the announcement of a male CEO. Lee and James (2007) shows evidence that news articles about the appointment of a female CEO are more likely to emphasize gender.

Finally, my paper relates to research on media bias. In political economy, media bias or refers to the choice to publish biased or inaccurate information (Gentzkow and Shapiro, 2006; Petrova, 2008; Besley and Prat, 2006). In my paper, I refer to a selection bias in the choice of which information to cover. I build on the notion of news selection first introduced by Nimark and Pitschner (2019). The main idea behind modeling news selection decisions is to acknowledge that only a subset of events is considered newsworthy in news media. The notion of news selection has been applied to partial information models in the macroeconomics literature to show how information reported in news media can shape agents' expectations and drive business cycles (Nimark, 2014; Chahrour et al., 2019). In my model, I use a similar information structure as in Nimark (2014) and Chahrour et al. (2019). Similarly to Nimark (2014) and Chahrour et al. (2019), the results in my paper show that editorial decisions made by news media can represent an important source of distortion for agents' decisions.

The rest of the paper is structured as follows. Section 2 introduces the data and the main estimating sample. Section 3 briefly describes the institutional environment in which firm-level coverage operates. Section 4 documents the key motivating facts. Section 5 intro-

[1] See for example Financial Review, November 2017.

duces the model, and section 6 presents the model calibration and counterfactuals. Section 7 concludes.

2 Data

2.1 Datasets and sample selection

CEOs BoardEx provides detailed data on executives in large companies around the world, including demographic characteristics, education, employment history, board interlocks, and network data. I select CEO positions in publicly listed US companies that started between 2000 and 2017. I exclude from the sample CEOs that cover dual positions or are also the company's President or CFO, and I exclude CEO Emeritus positions.

Companies I link CEOs to firm-level data using Compustat and CRSP, and obtain quarterly performance measures and stock price data. I use the firm-level files of BoardEx to obtain characteristics of the board and the the firm's management.

News News data are obtained from RavenPack News Analytics, a database that uses machine learning tools to organize unstructured content from news articles into structured data. RavenPack is a private company that tracks news released by both press and web sources all around the world. The database is used by private investors and across a broad range of academic research on the effects of media on financial markets.[2] The sources tracked by RavenPack include The Wall Street Journal, Dow Jones Newswires, Barron's, MarketWatch, as well as a large number of industry and business publishers, national and local news, and blog sites (roughly 19,000 sources). Most of the firm-level news included in the analysis are full articles (60% of the sample). The remainder of the sample is represented by news flashes, namely news articles composed of a headline and no body text. Relative to other media databases – such as Factiva – RavenPack does not allow the user to directly access the content of an article, and every news entry is associated with variables containing structured information provided by the algorithm. Moreover, observations in RavenPack are at the entity-level, so that there may be multiple entries for the same news article, depending on the numbers of entities involved in a news story. Although it provides the user with less flexibility than Factiva, RavenPack is particularly suitable for studying the effects of informa-

[2]For more information on RavenPack, see https://www.ravenpack.com/

tional flows rather than specific events, and is often used to analyze media sentiment around specific entities or events.

Every news observation in the dataset is categorized by an "event taxonomy", which allows understanding the broad content of an article, and an entity tag, which allows identifying the main entities involved in a news story. I only match news that are very strongly related to the entity mentioned, that is, I only match news in which the "relevance score" of a given entity is equal to 100.[3] For every entity-news entry, the database also provides a "sentiment score", which allows determining the sentiment content of the news article from the point of view of the entity mentioned. The score is derived from a collection of surveys in which financial experts rate entity-specific events as conveying either positive or negative sentiment, and to what extent. The analysts' ratings are then included in an algorithm that generates a score ranging from 0 to 100, where 50 indicates neutral sentiment, values above 50 indicate positive sentiment, and values below 50 indicate negative sentiment. I define a news as either "positive" or "negative" based on the sentiment score distribution. In the remainder of the paper, negative news will usually have sentiment score below the 10th percentile of the distribution, whereas positive news will have sentiment score above the 90th percentile.

News event and coverage for a news event I make an important distinction in news data. A *news event* is equivalent to a news story, and represents a particular happening for a firm at a given point in time. A distinctive feature of news data is that the same news event can be reported by multiple articles. *Coverage for a news event* is defined as the number of articles reporting the same news event. I link articles reporting the same news event using RavenPack's "novelty" and a "similarity" scores, which allow determining how new or similar news articles are, and grouping news articles by similarity. Section 3 discusses the motivation behind such choice in greater detail.

2.2 Sample description

I match news data to BoardEx using unique ISIN identifiers. Out of 3,126 positions in BoardEx, I am able to match 3,026 positions, 129 of which are covered by women.[4] Only

[3] For any news story that mentions an entity, the data provide a relevance score that indicates how strongly related the entity is to the underlying news story. A score of 0 means the entity was passively mentioned while a score of 100 means the entity was prominent in the news story.

[4] 20 positions are unmatched due to missing appointment dates in BoardEx, and 80 are unmatched due to missing news data.

18% of these are CEO positions in very large companies (such as S&P 500, S&P MID CAP, and S&P SMALL CAP).[5] Larger firms are more likely to appear in news media: as shown by Table C.1 in the Appendix, the firms that I am able to match to news data are on average larger than unmatched firms, and have larger boards. Table 1 shows the average characteristics of CEOs in the news-CEOs matched sample, separately by gender. Men and women CEOs are a homogeneous group in terms of observable characteristics such as age and education. Women tend to be appointed after longer tenures in the company, and their appointments are shorter on average, although these differences are not statistically significant. Women who make it to the top of the corporate ladder also have larger networks, with a difference of 156 connections on average. More significant differences appear when comparing firms that appoint male and female CEOs. Out of 2,043 companies in the sample, only 105 ever appoint a woman CEO; the sample size decreases even more if I focus on companies in which there is variation in gender across appointments – only 53 companies. Consistent with previous literature, Table 1 shows that women tend to become CEOs in smaller firms, and are more likely to be appointed in firms operating in the consumer and service sector (Bertrand and Hallock, 2001; Gayle et al., 2012).

Figure 1 shows the sentiment score distribution for the sample of matched news events, with the two vertical bars representing the 10th and 90th percentiles of the distribution. Over 30% of the news events reported have neutral sentiment, but there is substantial variation across news events. Table 2 presents descriptive statistics for the same data. I present news events by broad topic, separately by event sentiment. The most common news reported in the media include performance news and analysts' ratings. Negative news events also involve legal and regulatory issues, whereas the top positive events are represented by the release of new products and services. There is substantial variation in the number of articles across positive and negative events, with much smaller variation when looking at the number of days over which an event is reported: the overwhelming majority of news are "short lived" and are reported in the media for one day at most.

3 Firm-Level Media Coverage

Media outlets monitor firm performance and deliver information that can be easily accessed by shareholders, investors, and the general public. Although it is possible for investors to

[5]The rest of the positions are covered in public companies belonging to the Russell 3000 Index. Women are underrepresented in S&P 500, S&P MID CAP, and S&P SMALL CAP firms (12% of female positions, versus 18% for the full sample of CEOs).

monitor performance directly, for example through the company's website or social media, most of the public will rely on processed information available in the news.

The U.S. Securities and Exchange Commission (SEC) requires firms to release quarterly earnings information, which is then made publicly available in the SEC database. Starting from October 23, 2000, the U.S. Securities and Exchange Commission also requires all publicly traded companies to disclose "material nonpublic information" to all investors at the same time. The measure intends to regulate the practice of disclosing information to a select groups of investors and prevent insider trading. Examples of "material information" include: (1) earnings information; (2) mergers and acquisitions; (3) new products or discoveries; (4) changes in control or in management; (5) change in auditors; (6) events regarding the company's securities; and (7) bankruptcies or receiverships. To disclose information, firms can file a Form 8-K with the SEC, distribute a press release through a news or wire service, or through any other non-exclusionary method of disclosure, such as a public conference. Starting from April 2013, companies have the possibility to use social media platforms such as Facebook or Twitter.

Relative to general interest news, such as those reported by the *New York Times* or the *Washington Post*, firm-level news are often disclosed by the company itself, are verifiable, and arew published online. Once a company releases information, newswires can edit the content of the press release and disseminate it. Appendix Figure B.3 shows the number of press releases and news articles released for General Motors over the quarter January-March 2009. Press releases, full articles, and news flashes closely follow each other. However, conditional on a company reporting an event, there is large variation in the choice of news media over which events to emphasize. Online news tend to move fast and be short-lived, thus creating strong incentives for media outlets copy content from those moving first (Cagé, Hervé, and Viaud, 2019). Appendix Figure B.3 shows that most of the news articles released for a news event tend to be made available within the first 5-10 minutes following the first breaking news. The speed of diffusion of online news suggests that there is little scope for editing the content of an article relative to the first mover (Cagé, Hervé, and Viaud, 2019). Relative to more traditional means, such as newspapers, the online format also makes space constraints less binding for media outlets. Firms' obligation to disclose and the online format of news motivate the choice to document coverage patterns at the news event level. Given that an event was disclosed, how much coverage does it generate in news media? The following section provides an answer to such question and documents empirical regularities in firm-level coverage.

4 Motivating Facts

4.1 Empirical regularities in firm-level news coverage

When monitoring states of the world, news media make decisions as to which events are more newsworthy. Editorial decisions made by the media can be thought of as a *selection function* that maps states of the world to newsworthy events. The notion of news selection function was first introduced by Nimark and Pitschner (2019). The idea behind news selection functions is to provide a flexible way to model editorial decisions, without imposing structure on the mechanisms that drive those decisions (Chahrour et al., 2019). The journalism literature has identified empirical regularities on the features of news selection functions. In this section, I document empirical regularities of media behavior in firm-level coverage, and establish a number of key facts that will be useful in the reminder of the paper.

Unusual events are more covered In general, news media tend to emphasize extreme events rather than mundane events (Shoemaker and Vos, 2009). Such feature of media reporting has already been explored in the macroeconomics literature: Nimark (2014), for example, shows how extreme events published in the media can shape agents' expectations and drive business cycles.[6] Even in my sample of public companies, a few very rare events receive much more coverage than more commonplace events. Examples of rare events include, for example, antitrust investigations, insider trading stories, and product recalls. In Figure 2, I plot the raw average number of articles generated by each event, with the number of occurrences for an event reported on top of each bar. Out of more than 6 million events in the dataset, antitrust investigations, insider trading, and product recalls are extremely rare occurrences, and receive up to six times the coverage received by more commonplace news such as equity operations, technical analyses, and stock price events.[7]

Negative events are more covered Another empirical regularity in news reporting is that negative events are more likely to be covered in the media (Harrington, 1989; Soroka, 2012; Harcup and O'Neill, 2017). For example, Harrington (1989) documents that network television news overemphasize bad economic news. Similarly, Soroka (2012) documents that

[6] Nimark (2014) developed a terminology for public signals provided by the media. A story on a dog biting a man would not be published, whereas a man biting a dog would most likely be published. Therefore, he labels public signals provided by the media as "man-bite-dog" signals.

[7] I use the full sample of matched company-news data to have a more representative idea of the universe of published news events in the period 2000-2017.

the *New York Times* is more likely to report bad news about unemployment, inflation, and interest rates rather than good news about the same variables. In Figure 3, I show the number of articles for events of different quartiles of the sentiment distribution. Events at the bottom receive 12% more coverage than events at the top, after adjusting for firm performance, firm fixed effects, time fixed effects, and event category fixed effects.

4.2 News coverage and leadership

Having established general patterns of media coverage, I turn to understanding how the characteristics of the firm and the leadership correlate with media focus. I document that female CEOs receive more media coverage on average. When looking at news coverage by event sentiment, the difference is fully driven by events at the bottom of the sentiment distribution. Higher coverage being driven by negative events is consistent with negative events being inherently more newsworthy. In the next subsection, I investigate possible reasons behind such finding, and argue that it may be related to the outsider status of women in the executive labor market. In order to show that a negative news event receives more media coverage when a company is led by a female CEO, I estimate the following equation:

$$\text{Coverage}_e = \alpha + \text{Sent}_e\,\gamma + \text{CEO char}_{f(e)t(e)}\,\delta + \text{Perf}_{f(e)t(e)}\,\eta + \phi_{c(e)} + \phi_{f(e)} + \tau_{t(e)} + \nu_e \qquad (1)$$

where Coverage_e is the number of articles for event e, Sent_e is the sentiment score of the event, $\text{CEO char}_{f(e)t(e)}$ is a vector of characteristics of the CEO in firm f at time t, and $\text{Perf}_{f(e)t(e)}$ is a vector of performance measures, such as sales and assets. $\phi_{c(e)}$ is an event category fixed effect, $\phi_{f(e)}$ is a firm fixed effect, and $\tau_{t(e)}$ is a time fixed effect. I estimate Equation 1 for the full sample of events and separately for events with different sentiment. The results are shown in Table 3. First, the coefficient on the sentiment score in Table 3 is large and highly significant for news events at the tails of the sentiment distribution, and insignificant in the middle. This is consistent with the first fact documented in the previous section: extreme events are more likely to be covered in the media. Moreover, the size of the coefficient on the sentiment score is almost double in absolute value for very negative news events (i.e. in the bottom 10%) relative to very positive events (i.e. in the top 90%), consistently with negative news being more likely to be covered – the second fact in the previous section. When looking at the characteristics of the CEO, female CEOs receive more media coverage on average, but only for negative events. For the full sample of events, a news

event generates 0.5 additional articles for a female-headed firm; the difference is sizable, and corresponds to 24% relative to the sample mean. When looking at the results by event sentiment, the difference in average news coverage is entirely driven by negative news events. The coefficient on the female indicator is plotted in Figure 4. The coefficient is economically and statistically significant at the bottom of the sentiment distribution, with a gap between 30% and 37% relative to the sample mean.

It is possible that women CEOs get appointed in times of worse firm performance, which in turn would result in worse media coverage. Controlling for quarterly sales and assets mitigates this concern, but further robustness checks are presented in the next section.

4.2.1 Why is media coverage higher for female-led firms?

Female-led firms are more monitored by news media. But because negative events are more likely to be covered, the difference is larger for negative events. In this section, I investigate possible reasons why women are more covered by the media, especially for negative outcomes. As it will become clear, the explanations I propose are all related to the diversity status of women in the executive labor market, and thus may all co-exist at the same time.

Executives are a highly homogeneous group, and entry barriers in the occupation are high (Terviö, 2009). Women are still a minority in top leadership roles: as of 2017, female CEOs held only 4.8% of positions in Fortune 500 companies. Female CEOs may be perceived as outsiders and challenging the "status quo", and investors and shareholders may demand more information on their performance. To investigate this possibility, I construct measures that should capture outsider status and check if they fully absorb the female differential, and how they correlate with media coverage. I construct an indicator for CEOs at their first appointment, CEOs at the beginning of their tenure, namely in the first year of their appointment, and founders. The idea is that these CEOs should be less likely to be part of the known pool of CEOs and less connected to the appointing firm, thus attracting investors' interest. In Tables 4 and 5 I show how outsider status correlates with media coverage for negative and positive events. Similarly to women, CEOs with outsider status are more likely to be covered. The difference is driven by negative performance events. In Figure 5, I plot news coverage by event sentiment for outsider CEOs. Although the differences are not as high as those observed for female CEOs, the pattern is similar: for negative events, the difference in news coverage is sizable, while it is almost absent for more positive events. Information may be more valuable when the firm is led by an outsider CEO, especially for negative events. A key issue to address is whether such high demand for information under a female appointment –

and that of outsiders – is associated with higher firm-level uncertainty, which in turn would affect firm performance. The data do not reveal any difference in firm-level uncertainty after the appointment of a female CEO relative to a male CEO, neither when looking at stock prices nor when considering analysts' expectations. I address this point in detail in Appendix D.

Another interpretation is that higher media coverage for women could be the result of persistency in coverage decisions following appointment. CEO appointment is a crucial event for a firm, and usually attracts high media coverage, which may persist for some time following the appointment event. The fact that CEOs with low tenures are usually more covered may be related to the fact that lower tenures are closer to appointment. I verify in my data that the appointment of a female CEO generate more coverage relative to the appointment of other CEOs. The difference is 20% (p-value: 0.058) after controlling for firm size and removing outliers (that is, appointment events with coverage above the 99th percentile). Similarly, CEOs at their first appointment in a company generate more coverage: relative to other CEOs, the difference is 23% (p-value: 0.023) after controlling for firm size and removing outliers.

When documenting differences in coverage between male- and female-headed firms, the key challenge is understanding whether such differential treatment is driven by systematic differences in firm performance. I perform a number of robustness tests to corroborate the fact that my results are not explained by differences in firm performance or heterogeneity across firms. First, I check whether there are any significant differences in firm performance between male- and female-headed firms. If firms were more likely to appoint women in difficult times (the "glass cliff" hypothesis), then negative news for female-headed firms would be worse news, and thus would be more likely to be covered in the media. I plot the distribution of sales and stock prices separately for male- and female-headed firms in Figure B.4, and run OLS and quantile regressions in Table C.4. While there seems to be virtually no difference in stock price returns between male- and female-led firms, the distribution of sales looks less dispersed for women. If anything, results from the quantile regressions show a slightly positive difference in sales for female-headed firms relative to other firms.[8]

Even if there seem to be little or no differences in observable firm performance for firms that appoint a female CEO, one might still be concerned that the results on news coverage reflect unobservable circumstances that coincide with the appointment of female CEOs. This could be the case, for example, if the company was undergoing a change in firm strategy and the board wanted to signal the change by appointing a woman. If this was the case,

[8]These differences are small, given that the 25th, 50th, and 75th percentiles of the log-sale distribution for male-led firms correspond to 3.08, 4.6, and 6.08.

then the results in the previous section would just be reflecting a spurious correlation due to company circumstances that may have relatively little to do with the characteristics of the leadership. In order to check whether this is the case, I match to CEOs news articles that specifically mention the CEO as the main individual involved in a news story. I extend my main sample to include lower-ranked executives, and link news stories that mention the CFO, COO, and other lower-ranked executives. Again, I only match news articles an executive has maximum relevance. The results are presented in Appendix Tables C.2 and C.3. I standardize the dependent variable into z-scores to make the results comparable across executives. The results show that female executives are more likely to attract media attention relative to male executives in the same position, with the largest relative effects observed for CEOs. The results assure, at least partially, against the concern that changing company characteristics fully drive the results, and support the conjecture that women in top leadership positions may attract more media interest *per se*.

4.3 News coverage and turnover

In this section, I document whether media exposure has any effect on executive turnover. The board is likely to rely on private information not available in news media. Therefore, performance in news media may carry little weight towards the assessment of the quality of CEO performance. However, to the extent that firm reputation affects stock price performance, consumers' demand, and the ability of the firm to attract workers, the board may be reluctant to retain an executive who performs poorly in the news (Graf-Vlachy et al., 2020).

4.3.1 Empirical strategy

To document whether media exposure has any effect on CEO turnover, I exploit variation in the precise timing of news releases across firms. In order to have a homogenous sample of news events, I focus on performance-related news events only, and exclude events related to acquisition and mergers, legal and labor issues, and products and services. I also exclude all performance events related to bankruptcy. I estimate the equation:

$$P(\text{End of CEO app.}_{it}) = \alpha + \delta_1 \text{Negative articles}_{i,t-1} + \delta_2 \text{Positive articles}_{i,t-1} + \theta \text{Number of articles}_{i,t-1} + g(x_{it}) + \text{Perf.}_{i,t-1}\gamma + Z_i'\eta + \phi_{f(it)} + \tau_t + \nu_{it} \quad (2)$$

where the dependent variable, $P(\text{End of CEO app.}_{it})$, is the probability that the appointment of CEO i ends in quarter t. Such event can be CEO turnover or move to another firm, as I explain below. I regress the turnover indicator on a number of lagged variables, including the number of negative and positive articles, the total number of articles released, and CEO and firm characteristics. In particular, $\textit{Negative articles}_{i,t-1}$ represents the number of news articles with sentiment below the 10th percentile of the sentiment score distribution released in quarter $t-1$ for CEO i, and $\textit{Positive articles}_{i,t-1}$ represents the number of news articles with sentiment above the 90th percentile released in quarter $t-1$ for CEO i. $g(x_{it})$ is a second order polynomial in tenure, and $\text{Perf.}_{i,t-1}$ is firm performance at time $t-1$, namely quarterly ROA. [9] [10] Z_i is a vector of time-invariant characteristics at the CEO level, including a female indicator, network size, year of appointment fixed effects, and a quadratic function of age at the time of appointment. Finally, $\phi_{f(it)}$ and τ_t represent firm and time fixed effects. I cluster standard errors at the firm level.

My empirical strategy corresponds to a difference-in-differences specification with continuous treatment. However, the timing of news releases is not random. Although companies have an obligation to disclose information as soon as it becomes available, high-ability CEOs will still be able to manipulate the timing of news diffusion so that negative news on the company are released in more favorable times. Under such scenario, my estimates would be downward biased. Moreover, news reports rarely come as a shock, and firms may anticipate the effect of media coverage. Such scenario would correspond to a violation of the parallel trends assumption, and would also bias to my estimates downward. At the same time, the intensity of firm-level coverage may correlate with firm-specific shocks unobservable to the econometrician. If this was the case, I would be confounding the effect of news releases with the effect of unobserved firm-specific shocks, and my estimates would be biased upwards.

In order to provide a more transparent test of pre-trends and better isolate the effect of news releases from other confounders, I complement the strategy in Equation 2 with an event study approach. The idea is to inspect how news releases matter for the average firing behavior of firms, before and after a negative news release "shock". I define such shock as a quarter in which the firm experiences a number of negative (positive) performance articles greater than the 95th percentile in the firm-specific distribution over the period 2000-2017. I estimate the

[9] The results are unchanged if I control for tenure non-parametrically, or if I allow tenure to have a differential effect by gender.

[10] The results are unchanged if I control for quarterly sales or stock price returns instead of ROA.

equation:

$$P(\text{End of CEO app.})_{ft} = \alpha + \sum_{q \neq -1} \beta_q \mathbf{I}[q = t] + \sum_j \gamma_j \mathbf{I}[j = y(it)] + \sum_k \delta_k \mathbf{I}[k = s(it)] + \phi_f + u_{ft} \quad (3)$$

$P(\text{End of CEO app.})_{ft}$ is the probability of CEO appointment ending in firm f and quarter t. $\mathbf{I}[q = t]$ is an indicator variable for whether the event is experienced q quarters from quarter t. $\mathbf{I}[j = y(it)]$ is an indicator variable for calendar year y, and $\mathbf{I}[k = s(it)]$ is an indicator for quarter of tenure $s(it)$, measured at the time of the event. ϕ_f represents firm fixed effects. The coefficients δ_k are CEO-specific and identified in presence of firm fixed effects because I observe multiple CEO appointments within the same firm. Standard errors are clustered at the firm level.[11]

4.3.2 Results

I start by considering the results of the difference-in-differences specification in Equation 2. The results are shown in Table 6. Differently from previous work in the corporate finance literature, I do not attempt to classify the nature of turnover as due to resignation, retirement, or firing.[12] Instead, I compare three definitions of turnover. The first one defines turnover as any quarter in which I observe a CEO appointment ending. Former CEOs are often retained as lower-ranked executives, consultants, or board members. The second definition indicates whether the CEO is no longer retained in the company under any job title. Finally, I also look at whether the CEO moves to a private company or a company with smaller sales relative to the departing company, or whether information on the following job move is missing.[13] In order to avoid measurement error coming from the fact that for 10% of the quarter-position observations there are no news releases, in Panel A of Table 6 I focus on a subset of companies that is frequently covered in news media. High coverage firms include firms for which the median number of articles in a quarter is above the median across all firms (which corresponds to 4 articles per quarter). Table 6 shows that an additional negative article increases the probability of an appointment ending the following quarter by 2.3% relative to the sample mean. The number of negative articles released in a quarter is also strongly associated with the probability of being dismissed from all job appointments (column 2), and the probability

[11] I do not control for firm performance, because executive turnover is a determinant of firm performance.

[12] In an influential paper, for example, Parrino (1997) provides a method for classifying CEO turnover as due to firing, resignation, or retirement.

[13] In order to rank companies in terms of size, I divide companies into two-digit SIC sectors and obtain deciles of yearly sales in a given sector-year. I define a company as "smaller" if the difference in yearly sales with the departing company is greater than two deciles in the fiscal year preceding the job move.

of moving to a private or smaller firm (column 3). As for the number of positive news articles, the effect is small and insignificant in all specifications. Because the estimates are stable across high-coverage firms and the full sample of firms, measurement error is likely not to be the driver of the smaller coefficient on the number of positive articles.

Column 2 of Table 6 implies that an increase in the number of negative news from the 25th to to 75th percentile is associated with an increase in the replacement probability of about 0.2 percentage points, from 2.7% to 2.9% – which corresponds to a 7.5% increase. Such number is difficult to compare to previous work on CEO turnover, given that the corporate finance literature typically focuses on determinants of turnover other than the media. For example, Jenter and Lewellen (2019) find that turnover probability increases from 3.3% to 6.68% as stock market performance decreases from the 70th to the 20th percentile of the distribution in the preceding year. Jenter and Kanaan (2015) find that forced turnover probability increases from 2.05% to 4.14% as industry performance falls from the 90th to the 10th percentile in the preceding year. Relative to previous work on performance, my estimates for the effects of news are smaller. The discrepancy may be due to several reasons. Previous literature looks at turnover decisions made at a one-year horizon, whereas my estimates are at a quarterly frequency. Second, my results do not intend to reflect a causal effect, and may be downward-biased.

In order to assess the relevance of pre-trends, and to better isolate the effect of news releases from other confounders, I turn to the results of the event study analysis. The results for negative news releases are shown in Panel A of Figure 6. Relative to one quarter before the event, the probability of turnover jumps discontinuously at the time of the event, and peaks to 3.3 percentage points one quarter after. Panel A of Figure 6 also suggests the absence of anticipation effects in any of the five quarters leading to the event. Similarly to the results in Table 6, Panel B of Figure 6 shows that there is no clear pattern of replacement decisions following positive news releases. Although not necessarily causal, the results presented in this section suggest that news releases, and in particular negative news, are highly predictive of CEO replacement. Positive news seem to have very little effect. The asymmetry may be due to several reasons. First, when making hiring and firing decisions firms may seek to screen out particularly poor candidates in order to avoid very bad outcomes, rather than selecting the very top ones (Bergman et al., 2020). Moreover, people tend to put more weight on negative relative to positive information, a pattern that is known in psychology as negativity bias (Trussler and Soroka, 2014). Such interpretation could be even more relevant when disclosing information may harm a firm's reputation. As summarized by a famous quote: "It

takes many good deeds to build a good reputation, and only one bad one to lose it". [14]

5 A Model of Executive Turnover with News Selection

5.1 Model

I build a model of CEO turnover with event-dependent news reporting decisions. The model serves two purposes. First, it provides a framework for understanding how negative media focus affects firms' replacement decisions. I will then take the model to the data, and quantify how much the bias in news selection matters for CEO turnover, and for turnover in female-led firms. The model builds on classic models of employer's learning in the spirit of Jovanovic (1979). In every period, the firm observes current and past signals of firm performance and makes one decision: whether keeping or dismissing the CEO. Media outlets monitor performance realizations and decide which realizations to cover. News selection is event-dependent: worse performance events are more likely to be covered. Public beliefs on CEO ability are informed by the news, and taken into account by the board of directors when making the turnover decision.

5.1.1 Model set-up

Turnover In every period, the firm decides whether to keep or dismiss the CEO. The turnover decision d_t maximizes expected utility:

$$V(\mathbf{x_t}) = \max_{d_t, d_{t+1}, \ldots} E_t\left(\sum_{s=t}^{\infty} \delta^{s-t} u_s(d_s, \mathbf{x_s}) | d_t, \mathbf{x_t}\right)$$

where $\mathbf{x_t}$ is the vector of state variables. The optimization problem can be written recursively as a Bellman equation:

$$V(\mathbf{x_t}) = \max_{d_t} E_t(u_t(d_t|\mathbf{x_t})) + \delta V_{t+1}(\mathbf{x_{t+1}}|d_t, \mathbf{x_t})$$

The intra-period utility from keeping the CEO is a function of firm performance, q_t, the public reputation of the CEO, $\hat{q}_t$, and an idiosyncratic shock ϵ_t^K. As it is standard in the discrete choice literature, ϵ_t^K is distributed with a Type 1 Extreme Value distribution with scale parameter τ:

$$u_t(1, \mathbf{x_t}) = \kappa_1 q_t + \kappa_2 \hat{q}_t + \epsilon_t^K$$

[14] Benjamin Franklin.

If instead the firm dismisses its CEO, it pays the dismissal cost c and obtains a random utility shock ϵ_t^D:

$$u_t(0, \mathbf{x_t}) = \kappa_1 q_t + \kappa_2 \hat{q}_t - c + \epsilon_t^D$$

Let $V_t^K = E_t(u_t(1, \mathbf{x_t})) + \delta V_{t+1}((\mathbf{x_{t+1}})|1, \mathbf{x_t})$ and $V_t^D = E_t(u_t(0, \mathbf{x_t})) + \delta V_{t+1}((\mathbf{x_{t+1}})|0, \mathbf{x_t})$ be the choice-specific value functions for keeping and dismissing the CEO. These correspond to:

$$V_t^K(\mathbf{x_t}) = \kappa_1 \cdot E_t(q_t|\mathbf{x_t}) + \kappa_2 \cdot E_t(\hat{q}_t|\mathbf{x_t}) + \delta V_{t+1}((\mathbf{x_{t+1}})|1, \mathbf{x_t}) + \epsilon_t^K = \bar{V}_t^K + \epsilon_t^K \tag{4}$$

$$V_t^D(\mathbf{x_t}) = -c + V_0(\mathbf{x_0}) + \epsilon_t^D = \bar{V}^D + \epsilon_t^D \tag{5}$$

$V_0(\mathbf{x_0})$ in Equation 5 represents the utility from hiring a new CEO: if the board dismisses its CEO, the problem "reverts" to time $t = 0$, when the information set is given by the board's priors. The expectations $E_t(q_t|\mathbf{x_t})$ and $E_t(\hat{q}_t|\mathbf{x_t})$ in Equation 4 come from the fact that at the time of making the turnover decision, the board has not yet observed current CEO performance. CEO performance is a function of CEO ability. The board learns about CEO ability over time, as more and more performance signals are observed. Suppose learning is complete after T time periods. Then the asymptotic choice-specific value functions are:

$$V^K(\mathbf{x_T}) = E_T(\kappa_1 q_T|\mathbf{x_T}) + E_T(\kappa_2 \hat{q}_T|\mathbf{x_T}) + \delta V_{T+1}(\mathbf{x_{T+1}}|1, \mathbf{x_T}) + \epsilon^S = \bar{V}^K + \epsilon^K$$

$$V_T^D(\mathbf{x_T}) = -c + V_0(\mathbf{x_0}) + \epsilon^D = \bar{V}^D + \epsilon^D$$

and the optimization problem is $V(\mathbf{x}) = \max_{d \in \{0,1\}} \left(V^K(\mathbf{x}), V^D(\mathbf{x})\right)$

5.1.2 Learning environment

Private learning At the time of CEO appointment ($t = 0$), the board of directors has a normally distributed prior belief on CEO ability:

$$\alpha \sim N\left(\alpha_0, \sigma_0^2\right),\ \sigma_0^2 > 0$$

In every period of CEO tenure t, firm performance q_t is realized. q_t is a function of CEO ability and a random shock ϵ_t^q:

$$q_t = \alpha + \epsilon_t^q$$

$$\epsilon_t^q \sim N\left(0, \sigma_q^2\right),\ \sigma_q^2 > 0$$

The first expectation in Equation 4, $E_t(q_t|\mathbf{x_t})$, is given by:

$$E_t(q_t|\mathbf{x_t}) = E_t(q_t|q_1,...,q_{t-1})$$

which is calculated by the board using Bayes' rule, based on its prior and the history of performance signals up to $t-1$.

Public learning The media monitor performance realizations q_t and decide which realizations to make public. Publishing decisions are represented by the random variable S_t: when the media decide to publish event q_t, $S_t = 1$ is realized, and the signal q_t is made available to the public. Since the publication decision S_t is publicly observable, the board can calculate the second expectation in Equation 4, $E_t(\hat{q}_t|\mathbf{x_t})$:

$$E_t(\hat{q}_t|\mathbf{x_t}) = E_t(E_t(q_t|q_1,...,q_{t-1},S_1,...,S_{t-1})|\mathbf{x_t}) = E_t(q_t|q_1,...,q_{t-1},S_1,...,S_{t-1}) = \hat{q}_t$$

Note that even if private and public learning are about the same object – firm performance q_t – the two posterior beliefs $E_t(q_t|q_1,...,q_{t-1})$ and $E_t(q_t|q_1,...,q_{t-1},S_1,...,S_{t-1})$ are allowed to differ, depending on the sequence of random variables $S_1,...,S_{t-1}$.

5.1.3 News selection

The availability of the public signal ($S_t = 1$) depends on the realized event: the key assumption on the publication rule is that *negative* performance events are considered more newsworthy. The assumption is in line with the empirical evidence presented in the previous sections, and is an empirical regularity when looking at news reporting decisions.

Definition 1. Negative events are considered more newsworthy if the odds ratio of a publication conditional on the realization q_t, $\frac{P(S_t=1|q_t)}{P(S_t=0|q_t)}$, is decreasing in q_t.

Definition 1 introduces a selection bias in the way news media report information: worse performance realizations are more likely to be reported. I present a number of propositions that should help clarify how the selection bias introduced by Definition 1 produces downward-biased beliefs relative to a situation where information is reported in an unbiased manner.

First, it is possible to show that under the publication rule in Definition 1, the distribution of unpublished events first order stochastically dominates the distribution of published events.

Proposition 1. *If* $\frac{P(S_t=1|q_t)}{P(S_t=0|q_t)}$ *is decreasing in* q_t*, then* $P(q_t \leq q|S_t = 0) \leq P(q_t \leq q|S_t = 1)$.

Proof. In the Appendix.

The proposition states that published events come from a "worse" distribution relative to unpublished events. In fact, realizations on the left tail of the unconditional distribution of firm performance, $P(q_t)$, are more likely to be published. From first order stochastic dominance, it follows that the mean of published events is lower than the mean of unpublished events: $E(q_t|S_t = 1) \leq E(q_t|S_t = 0)$: on average, the value of firm performance is lower when it is made public relatively to when it is not. The next proposition states that the mean of published events is also lower than the unconditional mean of all events:

Proposition 2. *The mean of published events is lower than the unconditional mean of all events, that is:* $E(q_t|S_t = 1) \leq E(q_t)$.

Proof. In the Appendix.

Figure 7 helps visualizing these results. Figure 7 plots the unconditional distribution of firm performance $P(q_t)$, the conditional probability of publication $P(S_t = 1|q_t)$, and the distribution of published firm performance, $P(q_t|S_t = 1)$. The unconditional distribution $P(q_t)$ – the blue solid line – is centered around zero. The conditional probability of an event being reported, $P(S_t = 1|q_t)$, increases monotonically as q_t decreases, and approaches 1 for very low values of q_t. The distribution of reported events $P(q_t|S_t = 1)$ – the blue dashed line in Figure 7 – is shifted to the left relative to the unconditional distribution $P(q_t)$: the average event published by the media is a "worse" event relative to the average event in the true underlying distribution.

The fact that a publication is more likely to be available for negative performance realizations has implications for how public beliefs are updated. Public beliefs are more likely to be updated with negative performance information, and therefore are likely to be downward-biased. In Figure 8, I simulate the evolution of private and public beliefs over time for a draw of 100 CEOs. Simulating the evolution of private and public beliefs requires making assumptions on the distributions' parameters such that the publication rule in Definition 1 is satisfied. In Appendix B I describe how the distributional assumptions on CEO ability and firm performance q_t allow characterizing the family of conditional distributions $P(q_t|S_t = 0)$ and $P(q_t|S_t = 1)$ such that the publication rule in Definition 1 is satisfied. While the two learning processes in Figure 8 start from the same prior, they diverge over time, with public beliefs converging to a lower value in the long run. The result is due to the bias introduced by news selection, which is such that low realizations of firm performance are more likely to be published.

5.1.4 Consequences for turnover

Given the state variables up to time $t-1$, at every point in time t the board compares the expected benefit of keeping a CEO with the value of dismissing the CEO. News selection biased towards the negative performance states has two opposite effects on turnover. On the one hand, the value of dismissing the CEO decreases. Since the board is forward-looking, the negative selection bias will decrease the value of a hire to the firm, thus lowering the value of the firm's outside option. Everything else constant, decreasing the value of the firm's outside option decreases turnover. On the other hand, the negative selection bias decreases the value of keeping a CEO, especially as time moves on and private and public beliefs start diverging. Holding everything else constant, decreasing the value of keeping a CEO increases turnover. Theoretically, it is ambiguous which of the two effects will prevail. In practice, the second effect will turn out to be much stronger than the first one. Biased news selection affects the value of keeping a CEO at higher tenure levels: private and public beliefs diverge at higher tenures, as information becomes abundant and uncertainty decreases. But because the value of a hire is in present discounted terms, the value of keeping a CEO at higher tenure levels is more discounted relative to lower tenures. Therefore, the decrease in the value of a hire will not be enough to offset the loss in utility caused by biased public beliefs, and turnover will increase relative to the case with no selection bias.

5.2 Model's testable implications

The model delivers testable implications on the sensitivity of turnover to the arrival of negative news. At every point in time, public beliefs on CEO ability are summarized by the average value of the signal up to time t:

$$\hat{h}(t) = \frac{\sum_{s=1}^{t-1}(q_s|S_s = 1)}{t-1}$$

where q_s is firm performance at time s and S_s is the publication indicator. Two testable implications delivered by the model are:

(i) Conditional on tenure t, the probability of turnover increases as $\hat{h}(t)$ decreases.

(ii) Conditional on tenure t, the sensitivity of turnover to the arrival of a negative news increases as $\hat{h}(t)$ decreases.

The two predictions follow from Bayesian updating. In the model, an executive is dismissed at tenure time t if the board's posterior belief on the ability of the executive falls below the

endogenous replacement threshold set by the board. Prediction (i) states that the probability of turnover increases the closer beliefs get to the replacement threshold. Prediction (ii) states that, the closer beliefs get to the replacement threshold, the higher the marginal impact of a negative news on the probability of crossing such threshold. The two predictions are proved formally in Appendix A.

5.3 Empirical tests of model's implications

In order to take the model's predictions to the data, I map the average value of the signal up to time t, $\hat{h}(t)$, to the data as follows. I divide histories in two groups. In the first group of histories, the CEO experienced a negative publication in more than 50% of the tenure-quarters up to tenure-quarter $t-1$, where a negative publication is a news with sentiment at the bottom 10% of the distribution. Because such first group experienced negative news for a larger fraction of tenure time, I define it as the long history group. The second group includes all other histories, and is defined as the short history sample. I only consider high-coverage firms to avoid noise coming from sparse news data. In order to keep tenure constant, I focus on tenure-quarters below 2.5 years of tenure. According to prediction (i), the probability of turnover should be higher in the long history sample. The empirical test is presented in Table 7. Conditional on tenure, on average the turnover probability is higher for long histories. The results are robust to the addition of sector fixed effects and performance controls. According to prediction (ii), the marginal effect of a negative news on turnover should be higher in the long history sample. The prediction is tested in Table 8. I present results from the same specification as in Equation 2, separately for the two subsamples and replacing firm fixed effects with sector fixed effects. In line with the prediction, the coefficient on the number of negative news is positive and significant for the subsample of long histories, and much smaller for the subsample of short histories. When the probability of crossing the firing threshold is high, an additional negative news is likely to lead to the replacement of an executive.[15]

[15] I perform additional checks to isolate the effect of news from the effect of firm performance. First, I control for average realized ROA up to tenure-quarter t. Second, I cut the sample so as to focus on tenure-quarters with ROA below the median across the entire sample. The results are robust in both specifications and available in the replication files.

6 Implications for Turnover in Female-led Firms

6.1 Female-led firms

I now turn the case of female-led firms. Consider two types of firms: female- and male-headed firms ($g = F, M$). The two types are identical in terms of prior distribution of CEO ability and unconditional distribution of firm performance, but differ with respect to one feature: the media are more likely to publish a low performance realization for a female-headed firm relative to a male-headed firm. The assumptions on female- and male-headed firms are:

(i) The prior ability distribution is the same in the two firms: $\alpha^F \sim \alpha^M \sim N\left(\alpha_0, \frac{1}{\tau_0}\right)$

(ii) The unconditional distribution of firm performance is the same in the two firms: $P^F(q_t) \sim P^M(q_t)$;

(iii) There exists a performance threshold q^* such that $P^F(S_t = 1|q_t) > P^M(S_t = 1|q_t)$ for every $q_t < q^*$.

The model's assumptions are supported by empirical evidence. I discuss Assumption (i) and present corroborating evidence in Appendix section D.2. Assumption (ii) has been discussed in section 4.2.1, where I verify that there is no significant difference in performance between the two types of firms, neither when looking at sales or stock price returns. Assumption (iii) has been discussed in the first part of the paper, in section 4.2.

Given the assumptions, the intuition from the homogeneous case carries through the case of heterogeneous firms. When performance is low, the public is *more likely* to observe the public signal for female-led firms relative to male-led firms. For the same firm performance distribution, at any point in time public beliefs on female-led firms are likely to be more pessimistic relative to public beliefs for an average firm (see Figure 8), and the incidence of turnover will tend to increase for a female-led firm relative to an average firm. In other words, for the same firm performance the board requires female CEOs to be of a higher ability relative to male CEOs, so as to offset the loss in utility caused by more pessimistic public beliefs. A clear prediction of the model is that female CEOs will be more positively selected than their male counterparts around the time of replacement. As shown by Figure B.6 in the Appendix, the prediction is supported in the data. Right before the dismissal of a male CEO, firm performance follows a clear downward trend. No such trend is visible for female CEOs, for which firm performance is a much weaker predictor of dismissal.

6.2 Model calibration

I solve the dynamic programming problem numerically through value function iteration and obtain the board's optimal dismissal policy. The Appendix provides a detailed description of the model's solution, and the simplifying assumptions I make in order to deal with state space dimensionality.

The goal of the calibration is to obtain the model's parameters for the sample of male CEOs, and then feed in the differential media coverage measured in the data for women to run counterfactual simulations.

A period t in the model corresponds to a tenure year in the data. I require male CEOs to be observed at least 4 years to be included in the sample. I drop positions that lasted less than a quarter, and positions with incomplete news or performance data. The final sample includes 1,624 male CEOs.

I measure firm performance q_t as industry-adjusted ROA. I choose industry-adjusted ROA as opposed to sales or stock prices for several reasons. Relative to ROA, sales confound profitability with firm size. Stock prices typically react to news information as soon as it becomes available. Moreover, using ROA makes the results comparable with previous research (Bertrand and Schoar, 2003; Taylor, 2010). I measure CEO dismissal as an appointment ending, and the CEO not being appointed in the same company under any job title in the following quarter (that is, the indicator in the second column of Table 6). In order to calibrate the model, I divide parameters into three blocks.

Pre-set parameters The first block of parameters is set outside of the model. I set the discount factor δ to 0.9 to match the annual discount rate in Taylor (2010). Because utility is defined up to a scale, the scale parameter τ of the taste shock distribution is not identified and normalized to 1.

News selection The key insight for mapping news data to the model is that news coverage for an event in the data mirrors a selection probability in the model. Therefore, the parameters governing news selection are set to match the coverage bias in the data. First, I fix $\mu_{q|S=1}$, the mean of published performance events. I proceed as follows. For every parameter search, I simulate the probability distribution of performance events $f(q)$, and re-weight quartiles of $f(q)$ so as to match news coverage for events of different sentiment quartiles in Figure 3. I set $\mu_{q|S=1}$ equal to the mean of the re-weighted probability distribution of performance events. I then search over a grid of possible values for $\mu_{q|S=0}$ – the mean of unpublished events – and

select a value so as to match the slope in Figure 3, namely such that an event at the bottom 25% of the performance distribution has a 12-percent higher chance of being selected by the news relative to an event at the top 75%:

$$\frac{P(S=1|q<q_{25})-P(S=1|q>q_{75})}{P(S=1|q>q_{75})}=0.12$$

where q_j is the j-th percentile of the performance distribution. Note that for values α_0, $\mu_{q|S=0}$, and $\mu_{q|S=1}$ the unconditional probability of publication ω is fixed, because the relationship $\alpha_0=\omega\cdot\mu_{q|S=1}+(1-\omega)\cdot\mu_{q|S=0}$ has to hold.

Simulated method of moments The rest of the parameters are pinned down by moments in the data using simulated method of moments. The target moments and their value are described in Table 9. I explain the simplifying assumptions I make in order to obtain a fully identified model, and how each moment is informative of different parameters. First, I run a $AR(1)$ regression for firm profitability: $q_{it}=\lambda_0+\lambda_1 q_{it-1}+\epsilon_{it}$. The profitability intercept λ_0 is informative about the average skill across CEOs, and helps pin down the mean of the prior distribution of CEO ability, α_0. λ_1 captures how persistent firm performance is within a firm-CEO, and is informative about the within-CEO dispersion in firm performance σ_q. Since λ_1 is high, implying a low within-CEO variance in firm performance, σ_q is likely to be low. A low σ_q would imply that the board learns CEO ability quickly, a statement that does not fit the data. Moreover, firm performance is only an imperfect predictor of CEO turnover, and the board of director's assessment of the CEO relies on several unobserved factors outside of the model. Therefore, I assume that the board's perceived dispersion of firm performance is $\tilde{\sigma}_q$.[16] $\tilde{\sigma}_q$ is pinned down by mean performance by tenure time. In the data, mean performance increases with tenure: in the model this is due to the changing composition in the pool of CEOs, as the less able are dismissed and the more able remain in office. Because $\tilde{\sigma}_q$ governs how good the board is at detecting high-ability CEOs, mean productivity by tenure has to increase slower as $\tilde{\sigma}_q$ increases.

I discretize the news history variable – the average share of negative news over total news up to time $t-1$ – into three categories, corresponding to terciles of the distribution. In

[16] In order to better fit the data, Taylor (2010) assumes that the board relies on a noisy private signal in addition to firm performance. Although the assumption in Taylor (2010) is slightly different, the purpose is the same: firm performance is only an imperfect predictor of CEO turnover, and many other factors outside of the model contribute towards explaining turnover. Note that by assuming that the board's perceived standard deviation in firm profitability is $\tilde{\sigma}_q \neq \sigma_q$ I am imposing a departure from rational expectations. In a different context, the same assumption is made by Hoffman and Burks (2020).

the model, such categories map to a "publication state", where states with more negative publications are associated to more pessimistic public beliefs. I then run the regression: $q_{it} = \delta_0 + \delta_1 pub2_{it-1} + \delta_2 pub3_{it-1} + \epsilon_{it}$, where q_{it} is industry-adjusted ROA for firm i in quarter t, and $pub2_{it}$ and $pub3_{it}$ are two indicators for whether the history of negative publications in firm i and quarter t belong to the second or third tercile (the omitted category is $pub1_{it}$, corresponding to the first tercile). δ_0, δ_1, and δ_2 capture average firm profitability by publication state, where worse publication states are associated with lower firm profitability. The three coefficients are informative about the standard deviation of CEO skill, σ_0: the further apart the three publication states, the higher the dispersion in CEO skill. The survival rate at lower tenure levels and mean profitability over time help pin down the utility parameter κ_1, the board's utils per dollar of firm profits. In order to have a fully identified model, I set κ_2 – the board's utils per dollar of firm profits as perceived by public beliefs – equal to κ_1. The assumption is needed because true firm performance and public performance are highly correlated by construction, and intra-period utility is linear in both components. Therefore, it is hard to find a data moment that shifts κ_1 without affecting κ_2, so that the two parameters can be separately identified. The assumption implies that true and public performance have equal weight in the board's intra-period utility. Although it imposes a further restriction, the assumption may not be too strong, as the data show that both true and public performance – as proxied by performance news – are predictive of CEO turnover. Finally, the cost of dismissal c is pinned down by the survival rate at higher tenure levels: as tenure increases, learning converges and the firing cost plays a larger role. Note that the cost of dismissal c is in board's utils. c represents the board's perceived cost from dismissing a CEO, which includes not only monetary costs – such as severance payments – but also costs in terms of reputation and shareholders' satisfaction with the board's operations.

6.3 Model parameters

The estimation results for the model's parameters are presented in Table 10. In Figure B.7, I show the model fit for the target moments. The model fits the target moments fairly well. In Figure 9, I also show the model fit of the survival rate and average mean profitability over the first 15 years of tenure. The model fits the data quite well, in particular when considering the turnover hazard. In the data, the average turnover hazard over the first 15 years of tenure is 4.01%. In the model, the average turnover hazard over the first 15 years is 4.23%. The numbers are close to those estimated by previous literature: Taylor (2010), for example, finds the incidence of turnover to range between 3.45% and 4.04% over the period 2000-

2006. When looking at mean profitability by tenure time, the model overpredicts profitability in the first tenure period, and underpredicts profitability in the last tenure period. To further assess the sensitivity of my results, I compare my estimates with previous literature. To the best of my knowledge, Taylor (2010) is the only paper structurally estimating a model of CEO turnover, so I will mostly compare my estimates to Taylor (2010), although he analyzes an earlier time period (1990-2006) relative to my sample. First, the prior mean CEO ability in my model is higher than in Taylor (2010). The prior mean CEO ability is 2.06% of assets in my model, and 1.24% in Taylor (2010). The difference is possibly due to the high profitability intercept in my data (see Figure 9). The prior variance of CEO ability is equal to 4.84%, thus being within the range of previous estimates: 2.72% in Taylor (2010) and 7% in Bertrand and Schoar (2003). The within-CEO variance of firm performance, σ_q, is 2.28% in my model, and 3.61% in Taylor (2010). The difference is due to different modeling assumptions. In his model, Taylor (2010) assumes that firm profitability follows a $AR(1)$ process, and thus 3.61% represents the residual profitability variance after accounting for persistence. Because I do not have the $AR(1)$ assumption in my model, the variance of firm profitability has to be relatively low in my model in order to fit the high persistence of profitability within a firm-CEO. The perceived within-CEO variance of firm performance – $\tilde{\sigma}_q$ – is high, and equal to 9.65%. As explained in the previous subsection, the assumption is needed in order to slow down board's learning, which most likely relies on additional factors outside of the model when making the turnover decision. To fit the same feature of the data, Taylor (2010) assumes that the board relies on an additional private signal of firm performance, whose variance is also large and close to my estimate (9.51%). Finally, the cost of dismissal is 3.46% in my model, which is close to the estimate in Taylor (2010) (3.95%). Given the average value of firm assets in my estimating sample, a cost of 3.46% implies that the board of the average firm behaves as if dismissing a CEO costed $347 million to the firm.

6.4 Counterfactual simulations

Having estimated the structural parameters of the turnover model, I can run counterfactual simulations and quantify of much the bias in news selection is able to account for differential turnover in female-led firms. In practice, given the parameters of the ability and profitability distributions and the board's utility parameters, I change the parameters governing news selection so as to match the differential bias measured empirically for women. Row B of Table 11 shows the news selection bias and implied hazard for the baseline model. As explained in Section 6.2, in the baseline version of the model news selection bias is defined as the differ-

ential selection probability of an event at the bottom of the profitability distribution relative to the top, and is set to match the slope in Figure 3. The implied turnover hazard averaged over the first 15 years in office of the CEO is 0.0423. Removing the selection bias in Panel A of Table 11 decreases the turnover hazard by 9.7% relative to the baseline model. Removing the selection bias implies that a performance realization at the bottom of the distribution has the same publication probability than an event at the top, and makes public beliefs aligned with the board's beliefs. The absence of the selection bias creates two opposite effects on turnover relative to the baseline model. On the one hand, the firm's outside option increases, because the absence of the selection bias will increase the value of a hire to the firm. Everything else constant, increasing the firm's outside option increases turnover. On the other hand, the absence of the selection bias increases the value of keeping a CEO, especially for CEOs with higher tenures, when beliefs are less volatile and both private and public beliefs converge to their long-run value. Holding everything else constant, increasing the value of keeping a CEO decreases turnover. The second effect turns out to be much stronger than the first one.

Row C of Table 11 sets news selection to match the evidence for women. For women, a performance event at the bottom 10% of the sentiment distribution generates 41% additional coverage relative to an event at the top 10% (Table 3). Increasing the selection bias from 12% to 41% increases turnover by about 3%. Given that the differential turnover for female CEOs is around 20%, the difference in news selection explains around 15% of the differential turnover observed for women.[17] Because in the baseline version of the model all CEOs are homogeneous, the counterfactual in row C assumes that a female CEO will always be replaced by another female CEO. I run an additional counterfactual assuming that the firm's outside option is a male. In practice, I replace the value of a hire implied by the model with the value of a male hire as implied by the baseline model. Because the value of hiring a male is higher, the turnover hazard increases a little, but the difference is negligible. Such small difference is due to the fact that the bias in news selection matters the most for high values of tenure, as public and private beliefs diverge. Since the value of a hire is in present discounted terms, high tenure values are more discounted by the board. The model implies that the value of hiring a female CEO is almost the same as the value of hiring a male ex ante, but not ex post: as tenure increases, female CEOs will generate less value to the firm relative to their male counterparts. Finally, in row D I simulate the model feeding in the news

[17] Differences in turnover by gender are shown in Appendix Table C.5. Keller et al. (2020) finds that women executives are more likely to leave the firm by 2 percentage points relative to comparable men. Their estimates include CEOs and lower-ranked executives as well. Gupta et al. (2020) finds that female CEOs are 45% more likely to be fired relative to comparable men. Their definition of turnover uses the classification introduced by Parrino (1997).

selection bias estimated for women at their first appointment. The estimates in Tables 4 and 5 imply that a for women at their first appointment a performance event at the bottom 10% of the sentiment distribution generates 67% additional coverage relative to an event at the top 10%. Under such counterfactual scenario, the news selection bias increases turnover by around 4.7% relative to the baseline model, thus accounting for about 24% of the gap in the turnover hazard measured for female appointments relative to male appointments.

7 Conclusions

I show that negative media focus can affect firms' replacement decisions in public companies, especially in firms led by executives who may be perceived as outsiders, such as women and newly appointed CEOs. My results suggest that between 15% and 20% of the differential turnover measured in female-led firms may be excessive and would not take place in a counterfactual scenario where news media behave as for the average CEO. In several contexts, information disclosure has beneficial effects, especially when it exposes negative outcomes. Public attention improves firms' accountability and mitigates the agency problem between the management and stakeholders. My results are not in contradiction with this view, and show that adverse effects of information disclosure can arise when the negative focus is systematic and more severe for leaders for which there is less information to begin with. From the standpoint of policymakers, my results are positive rather than normative, and highlight one additional hurdle for improving access to top leadership positions. Policymakers have recognized such goal as a priority: in Europe and more recently in California, for example, gender quotas on corporate boards have been mandated to improve female representation in the boardroom. My results could also point to a shortcoming of quotas. Because quotas are a tool to promote outsiders, unintended effects may arise in the short run if outsiders are penalized in news media. My results suggests that quotas likely need to be implemented for a long period of time in order to fully reap their beneficial effects.

My work tackles a specific mechanism that can apply to an extraordinarily special group of workers: CEOs. More research is needed in order to understand how to promote the career advancement of women in professional environments and at the top echelons of the earnings distribution, a goal that has been shown to improve efficiency (Hsieh et al., 2019). As argued by Terviö (2009), public information plays a crucial role in highly-paid professions in which performance on the job is publicly observable. Further research is needed in order to understand more broadly how the media influence the executive labor market – for example,

through executive compensation.

My paper is concerned with studying the consequences of media focus rather than the reasons behind specific editorial decisions. Understanding the reasons behind editorial decisions would be an important question to answer in order to understand the sources of inefficiencies, and better guide policymaking. I leave the answer to such important question to future research.

8 Figures

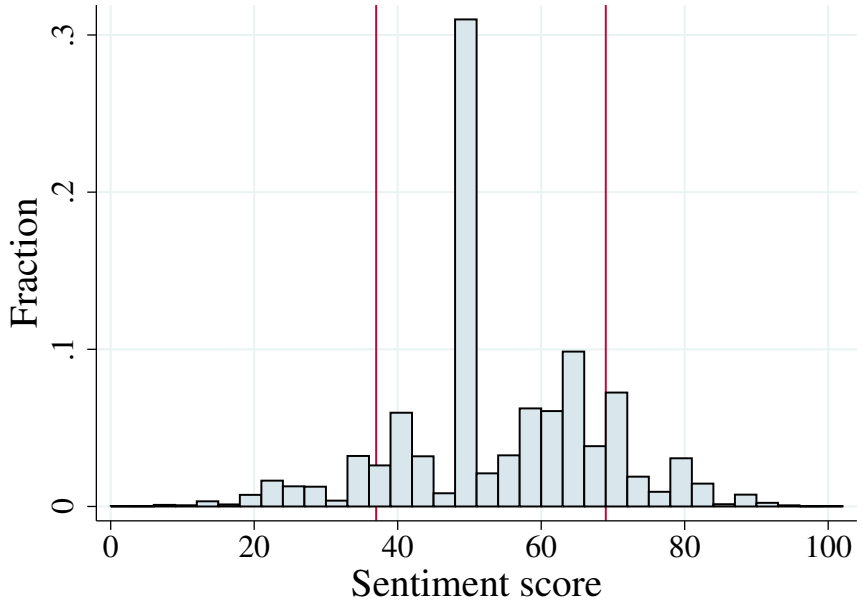
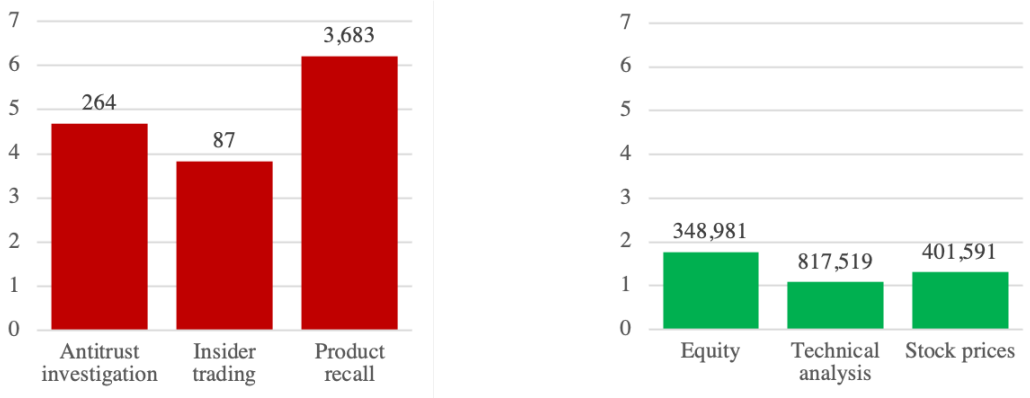


Figure 1: Sentiment score distribution

Notes: Sentiment score distribution of news events. The vertical bar on the left represents the 10th percentile of the distribution (score = 37), the vertical bar on the right represents the 90th percentile of the distribution (score = 69).



(a) Unusual news events

(b) Common news events

Figure 2: Unusual events are more covered

Notes: Average number of articles for different categories of news events. The number on top shows the number of events of each category in the dataset. The total number of events in the dataset is 6,923,931.

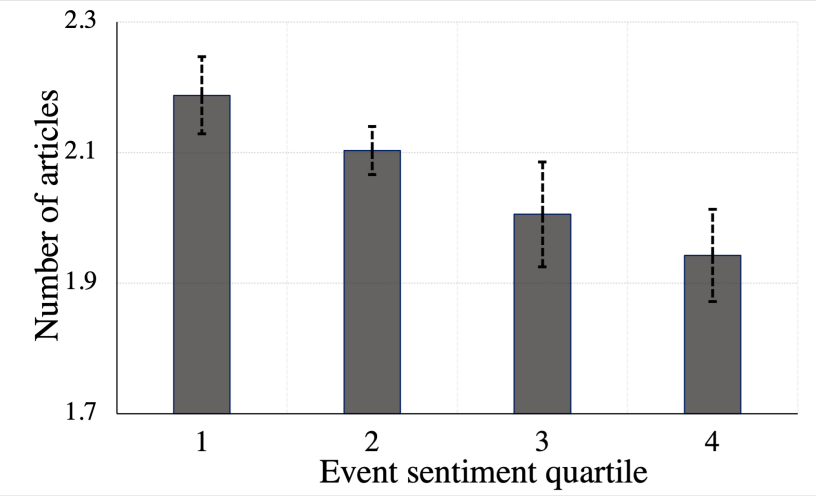


Figure 3: Negative events are more covered

Notes: Linear prediction from a regression of the number of articles for an event on sentiment quartiles, log(sales), event category fixed effects, (35 categories), firm and time fixed effects. The dotted bars show the 90% confidence interval.

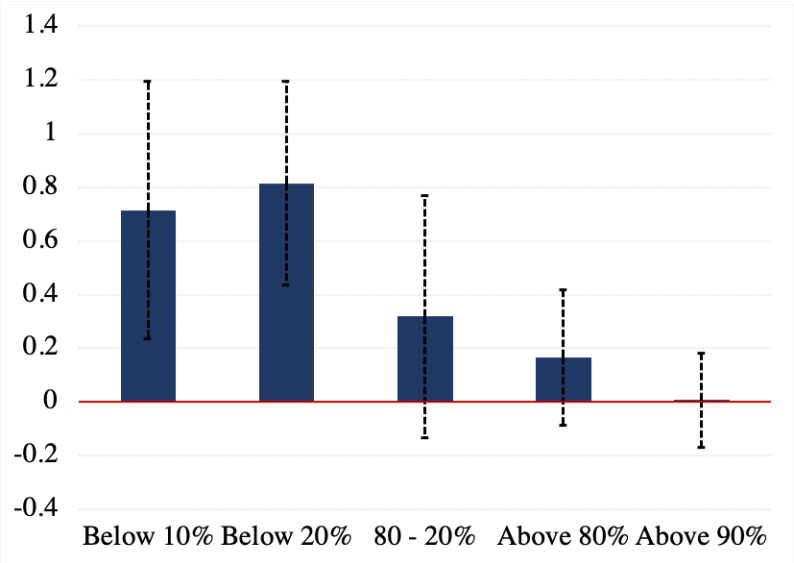
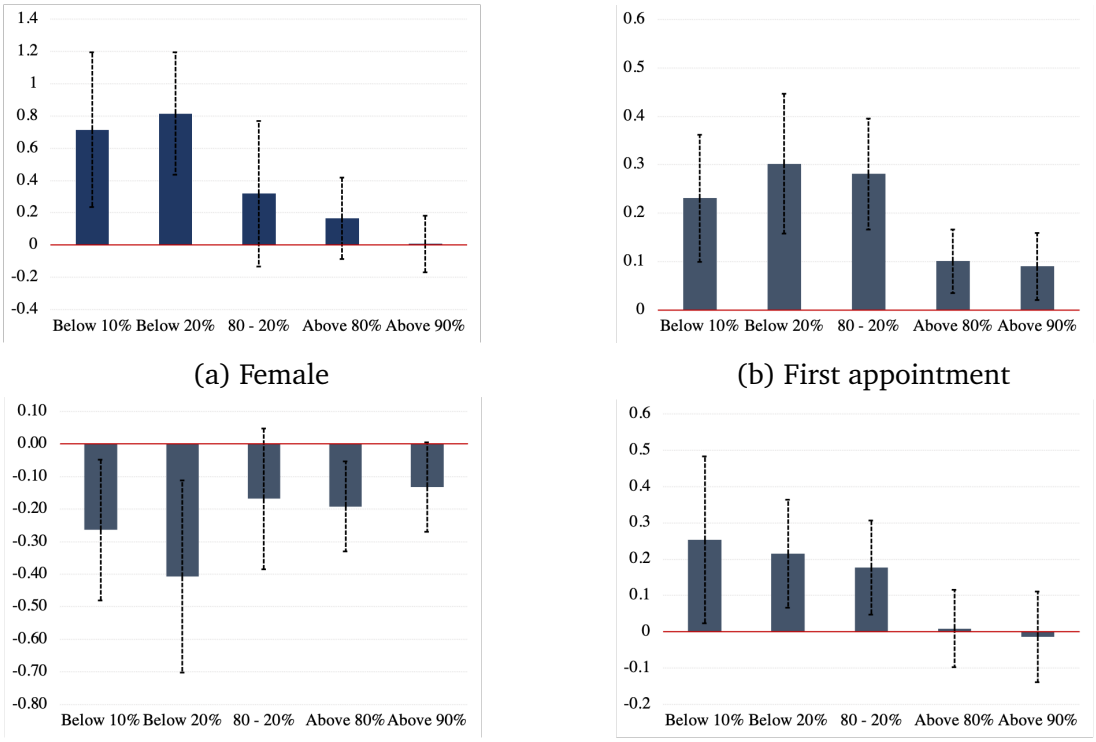


Figure 4: Coverage for a news event, female differential

Notes: The graph shows the coefficient on the female indicator from a regression of the number of articles for a news event on news event sentiment, CEO characteristics, firm characteristics, firm and time fixed effects. Every bar corresponds to the coefficient from a different regression. The y-axis unit is number of articles for a news event. The x-axis shows the news sentiment distribution corresponding to each subsample of news events. The plotted coefficients are shown in Table 3. The dotted bars show the 90% confidence interval.



(a) Female

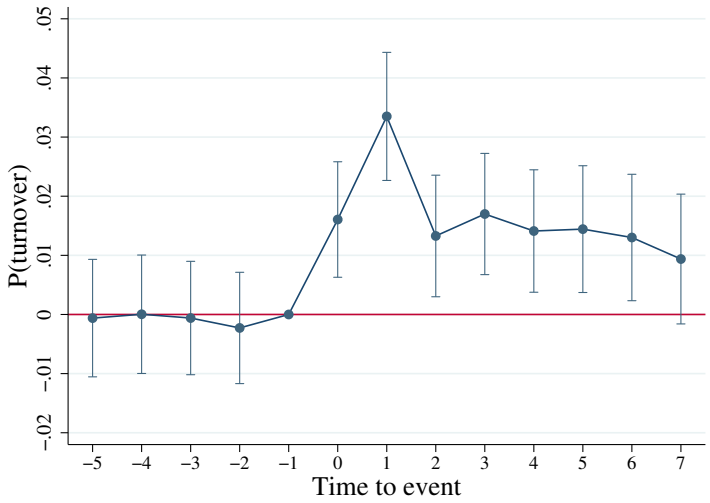
(b) First appointment

(c) Tenure

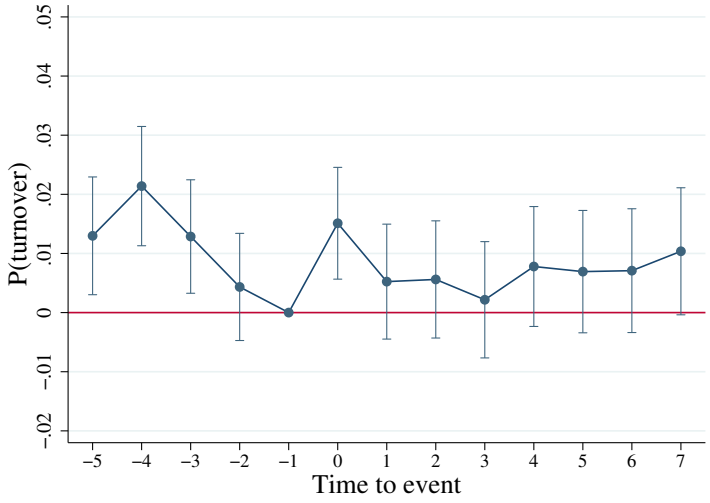
(d) First year

Figure 5: Coverage for a news event, outsider CEOs

Notes: The graph shows the coefficient on the female indicator (Figure a) and measures indicating outsider status (Figures b,c, and d) from a regression where the dependent variable is represented by the number of articles for a news event. Every regression controls for news event sentiment, CEO characteristics, firm characteristics, firm and time fixed effects. Every bar corresponds to the coefficient from a different regression. The y-axis unit is number of articles for a news event. The x-axis shows the news sentiment distribution corresponding to each subsample of news events. The plotted coefficients are reported in Tables 3, 5, and 4. The dotted bars show the 90% confidence interval.



(a) Effect of negative news on turnover



(b) Effect of positive news on turnover

Figure 6: Effect of news on turnover

Notes: The graph shows the results from the event study for the effect of negative news releases on firms' replacement decisions. Quarterly observations between 2000 and 2017. A negative news release event is defined as a quarter in which the firm experiences a number of negative (positive) performance articles greater than the 95th percentile of the firm-specific distribution over the period 2000-2017. The dependent variable is an indicator for whether the CEO is in the first quarter of tenure. The omitted time period corresponds to the quarter preceding the event. Standard errors are clustered at the firm level. The vertical bars represent 95% confidence intervals.

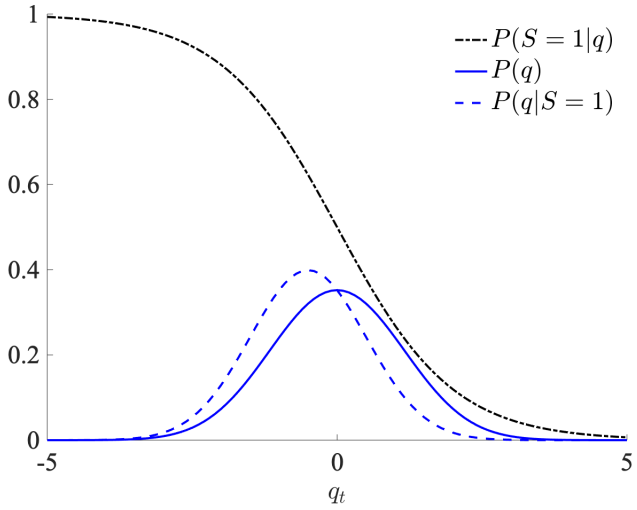


Figure 7: News selection

Notes: The graph shows how the unconditional distribution $P(q)$ and the conditional distribution $P(q|S=1)$ map to a conditional selection probability $P(S=1|q)$. The blue solid distribution represents the unconditional distribution of firm performance $P(q)$, and the blue dotted distribution is the distribution of published firm performance $P(q|S=1)$. The dotted probability represents the conditional publication probability (or news selection function) $P(S=1|q)$ of firm performance.

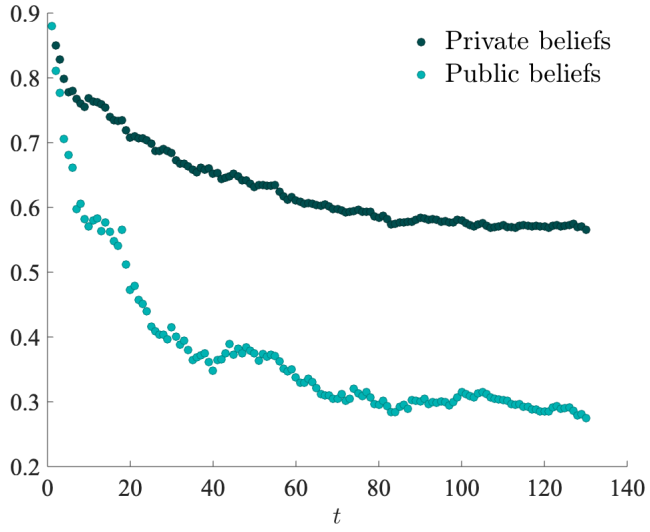
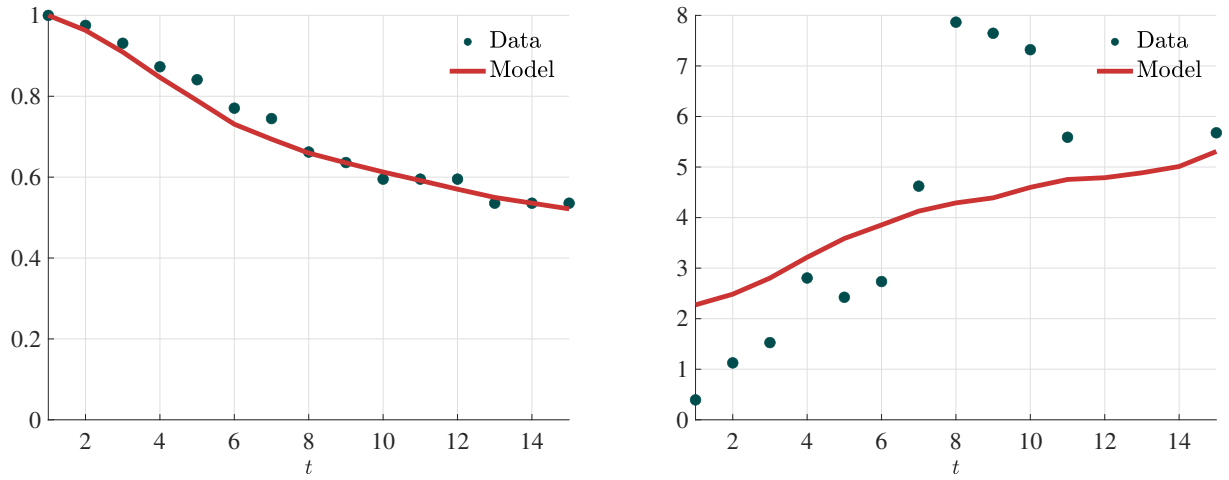


Figure 8: Private and public beliefs

Notes: Simulation of private and public beliefs over the long run for a draw of 100 CEOs from the distribution $\alpha \sim N(\alpha_0 = 0.88, \sigma_0 = 2.42)$ (from Taylor, 2010). The dark series on top represents private beliefs, whereas the lighter series at the bottom represents public beliefs.



(a) Survival function (b) Average profitability

Figure 9: Model fit

Notes: Survival function in Panel (a) and average profitability by tenure year in Panel (b). The model is simulated for 1,624 CEOs using the parameters in Table 10.

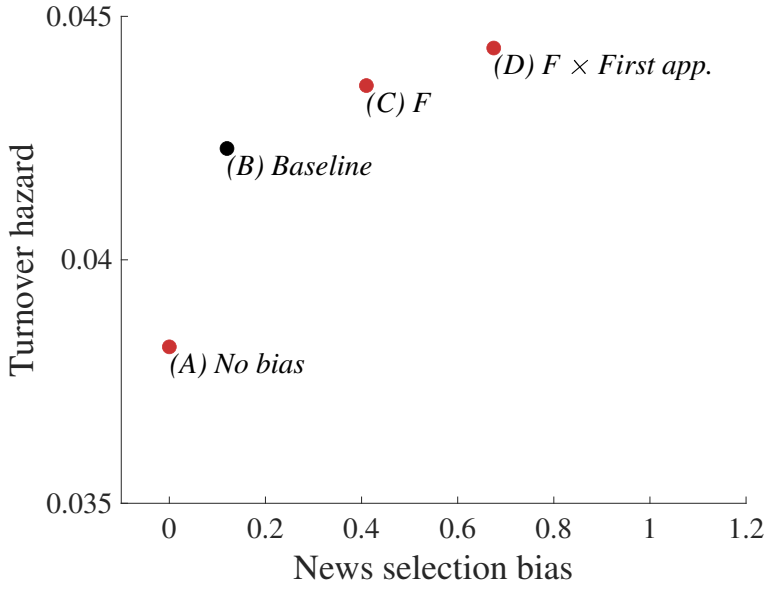


Figure 10: Baseline model and counterfactuals

Notes: *(A) No bias*. Counterfactual simulation, obtained by removing the news selection bias. *(B) Baseline*. Baseline model. The parameters for the baseline model are in Table 10. *(C) F*. Counterfactual simulation, obtained by simulating the model feeding in the news selection bias estimated for women CEOs. *(D) F × First app*. Counterfactual simulation, obtained by simulating the model feeding in the news selection bias estimated for women CEOs at their first appointment.

9 Tables

Table 1: CEOs, by gender

	Women		Men		Difference	p
	Mean	SD	Mean	SD		
Panel A1. Individual characteristics						
Age	52.59	7.06	52.60	8.22	-0.01	0.993
Born in the US	0.94	0.24	0.92	0.28	0.02	0.574
Bachelor's degree	0.35	0.48	0.29	0.45	0.07	0.115
Master's/MBA/Prof. degree	0.36	0.48	0.45	0.50	-0.09	0.055
Doctorate degree	0.16	0.36	0.15	0.36	0.00	0.914
Number of qualifications	1.89	1.20	1.92	1.09	-0.03	0.801
Appointment dur. (days)	650.42	730.26	697.77	765.54	-47.35	0.514
Tenure in company (years)	7.32	9.37	6.53	8.29	0.79	0.374
Network size	1,325.24	1,617.72	1,169.26	1,420.68	155.97	0.229
Total number of boards	2.01	1.61	1.93	1.65	0.08	0.662
Panel A2. After end of appointment:						
End of all appointments	0.29	0.45	0.21	0.41	0.08	0.077
Private or smaller firm/ missing move	0.22	0.42	0.17	0.37	0.05	0.264
Panel B. Board characteristics						
Gender ratio	0.76	0.11	0.91	0.10	-0.15	0.000
Number of directors	8.23	2.06	8.46	2.51	-0.24	0.378
Panel C. Firm characteristics						
Assets	5,214.55	20,908.14	8,123.41	73,910.11	-2908.87	0.686
Employees	9.70	29.61	8.37	28.74	1.32	0.644
Sales	3,523.68	16,343.86	2,555.31	9,929.19	968.37	0.343
Gross profits	921.21	3,071.22	842.44	3,397.51	78.77	0.815
Market value	2,889.77	8,973.50	3,698.14	16,623.82	-808.37	0.623
Primary sector	0.03	0.18	0.15	0.35	-0.11	0.000
Consumer sector	0.26	0.44	0.15	0.35	0.12	0.000
Service sector	0.71	0.46	0.71	0.46	0.00	0.946
Number of positions	129		2,897			
Number of firms	105		1,938			

Notes: Source: Panel A and B: BoardEx, 2000-2017, Panel C: Compustat, 2000-2017. Data for the sample of matched news-firm-CEOs. Individual and board characteristics are measured in the year of the appointment (except *Appointment duration*), whereas firm characteristics are measured in the year before the appointment.

Table 2: News events, by sentiment

	Number of events published	Share of total	Sentiment score: Mean	Sentiment score: SD	Articles per event: Mean	Articles per event: SD	Days per event: Mean	Days per event: SD
Panel A. Negative events (< 10th ptile)								
earnings	29,466	0.30	26.94	7.89	2.02	4.47	1.06	0.26
analyst-ratings	18,577	0.49	31.50	6.37	1.32	1.13	1.03	0.18
order-imbalances	13,757	0.64	32.96	0.51	1.37	0.77	1.12	0.39
legal	12,109	0.76	22.10	1.98	5.09	11.89	1.30	0.70
revenues	4,626	0.81	24.84	6.73	2.81	9.40	1.11	0.38
regulatory	3,582	0.84	22.30	0.71	3.21	5.87	1.22	0.58
price-targets	3,464	0.88	25.87	7.32	1.18	0.71	1.02	0.15
products-services	3,153	0.91	28.87	5.84	4.47	14.86	1.23	0.71
credit-ratings	2,366	0.94	29.52	4.94	2.13	1.79	1.03	0.18
Panel B. Positive events (> 90th ptile)								
products-services	82,220	0.20	66.31	5.14	3.95	24.51	1.20	1.25
earnings	54,526	0.32	72.00	8.80	2.20	4.40	1.06	0.25
technical-analysis	46,004	0.43	58.96	1.65	1.09	0.41	1.04	0.24
analyst-ratings	37,148	0.52	71.21	10.85	1.19	0.62	1.02	0.14
stock-prices	34,630	0.60	63.00	0.00	2.45	6.55	1.14	0.43
acquisitions-mergers	28,369	0.67	66.46	7.10	2.26	6.43	1.10	0.35
partnerships	23,371	0.73	61.04	0.19	2.97	5.53	1.12	0.42
equity-actions	20,373	0.78	64.35	6.67	1.98	4.31	1.07	0.29
revenues	18,351	0.82	66.70	11.31	2.15	3.88	1.06	0.30

Notes: Source: RavenPack News analytics, 2000-2017. Data for the sample of matched news-firm-CEOs. Negative events in Panel (A) are events at the bottom 10% of the sentiment distribution. Positive events in Panel (B) are events at the top 90% of the sentiment distribution.

Table 3: News coverage for an event, and firm and CEO characteristics

	(1)	(2)	(3)	(4)	(5)	(6)
		By event sentiment:				
	All	*Below 10%*	*Below 20%*	*20% – 80%*	*Above 80%*	*Above 90%*
Female	0.539***	0.715**	0.815***	0.318	0.166	0.007
	(0.150)	(0.292)	(0.231)	(0.276)	(0.154)	(0.107)
Network size	-0.000***	-0.000***	-0.000***	-0.000	-0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Born in the US	-0.023	-0.051	-0.045	-0.079	0.152***	0.098
	(0.065)	(0.096)	(0.096)	(0.065)	(0.056)	(0.061)
Number of qual.	0.046	-0.052	0.081*	0.044	-0.009	0.022
	(0.031)	(0.045)	(0.048)	(0.031)	(0.024)	(0.026)
Age	-0.047	-0.032	-0.223**	0.025	0.018	-0.002
	(0.059)	(0.065)	(0.102)	(0.059)	(0.042)	(0.052)
Age sq.	0.001	0.000	0.002**	-0.000	-0.000	0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)
Tenure	-0.030***	-0.047**	-0.066***	-0.015	-0.032**	-0.019*
	(0.008)	(0.021)	(0.021)	(0.012)	(0.013)	(0.011)
Tenure sq.	0.000***	0.000***	0.000**	0.000***	0.000**	0.000*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Sentiment score	0.002	-0.050***	-0.018***	0.022	0.031***	0.032***
	(0.001)	(0.008)	(0.007)	(0.019)	(0.005)	(0.005)
Log(sales)	-0.037*	0.011	-0.075*	-0.049**	0.000	0.006
	(0.022)	(0.037)	(0.040)	(0.022)	(0.040)	(0.044)
Log(assets)	0.015	0.202**	0.281***	-0.048	-0.038	-0.059
	(0.038)	(0.079)	(0.068)	(0.041)	(0.050)	(0.064)
Quarter FE	Y	Y	Y	Y	Y	Y
Year of app. FE	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	
N	591,257	62,384	123,344	351,837	116,047	93,128
Mean	2.239	2.361	2.189	2.292	2.131	2.179

Notes: Observations are news stories released between 2000 and 2017 in the full sample of matched news-CEO firms. The dependent variable is represented by the total number of articles for a news event. The estimating specification is equation 1 in the text. Standard errors are clustered at the position level. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table 4: News coverage for a negative event and outsider CEOs

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
				A. Sentiment below 10%			
Female	0.695**	0.694**	0.688**	0.687**	-0.079	-0.085	0.698*
	(0.329)	(0.322)	(0.322)	(0.327)	(0.310)	(0.284)	(0.356)
First appointment		0.204**	0.190**		0.148*		
		(0.082)	(0.079)		(0.078)		
First year			0.253*			0.162	
			(0.139)			(0.113)	
Founder				0.186**			0.170*
				(0.093)			(0.095)
F × First app.					1.291**		
					(0.521)		
F × First year						1.718*	
						(0.911)	
F × Founder							0.393
							(0.658)
				B. Sentiment below 20%			
Female	0.469	0.469	0.456	0.458	-0.091	-0.126	0.514
	(0.334)	(0.320)	(0.319)	(0.331)	(0.310)	(0.215)	(0.364)
First appointment		0.263***	0.261***		0.225***		
		(0.085)	(0.084)		(0.084)		
First year			0.219**			0.148**	
			(0.088)			(0.075)	
Founder				0.288			0.297
				(0.189)			(0.196)
F × First app.					0.977*		
					(0.523)		
F × First year						1.401**	
						(0.642)	
F × Founder							-0.469
							(0.600)
CEO char.	Y	Y	Y	Y	Y	Y	Y
Tenure quadratic	Y	Y	N	Y	Y	N	Y
Quarter FE	Y	Y	Y	Y	Y	Y	Y
Sector FE	Y	Y	Y	Y	Y	Y	Y

Notes: Observations are news events released between 2000 and 2017 in the full sample of matched news-CEO firms. The dependent variable is represented by the total number of articles for a news event. The estimating specification is Equation 1 in the text, in which firm fixed effects are replaced with sector fixed effects. CEO characteristics include network size, a dummy for whether the CEO was born in the US, the number of qualifications, a quadratic in age, and year of appointment fixed effects. The number of observations is 62,384 in Panel A and 123,344 in Panel B. Standard errors are clustered at the position level. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table 5: News coverage for a positive event and outsider CEOs

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
				A. Sentiment above 90%			
Female	-0.053	-0.058	-0.058	-0.058	-0.172*	-0.073	-0.024
	(0.131)	(0.128)	(0.129)	(0.131)	(0.102)	(0.216)	(0.144)
First appointment		0.091**	0.085**		0.084*		
		(0.042)	(0.041)		(0.043)		
First year			-0.013			-0.019	
			(0.075)			(0.076)	
Founder				0.108			0.116
				(0.088)			(0.090)
F × First appointment					0.185		
					(0.211)		
F × First year						0.043	
						(0.230)	
F × Founder							-0.300
							(0.300)
				B. Sentiment above 80%			
Female	-0.047	-0.050	-0.052	-0.051	-0.224*	-0.114	-0.017
	(0.156)	(0.152)	(0.152)	(0.156)	(0.118)	(0.214)	(0.171)
First appointment		0.102***	0.099**		0.091**		
		(0.039)	(0.039)		(0.040)		
First year			0.008			-0.003	
			(0.064)			(0.065)	
Founder				0.120			0.128
				(0.083)			(0.085)
F × First appointment					0.290		
					(0.246)		
F × First year						0.143	
						(0.178)	
F × Founder							-0.332
							(0.307)
CEO char.	Y	Y	Y	Y	Y	Y	Y
Tenure quadratic	Y	Y	N	Y	Y	N	Y
Quarter FE	Y	Y	Y	Y	Y	Y	Y
Sector FE	Y	Y	Y	Y	Y	Y	Y

Notes: Observations are news events released between 2000 and 2017 in the full sample of matched news-CEO firms. The dependent variable is represented by the total number of articles for a news event. The estimating specification is Equation 1 in the text, in which firm fixed effects are replaced with sector fixed effects. CEO characteristics include network size, a dummy for whether the CEO was born in the US, the number of qualifications, a quadratic in age, and year of appointment fixed effects. The number of observations is 93,318 in Panel A and 116,047 in Panel B. Standard errors are clustered at the position level. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table 6: Turnover and news

	(1)	(2)	(3)	(4)	(5)	(6)
	End of:		*CEO moves to:*	*End of:*		*CEO moves to:*
	CEO app.	All app.	Private or smaller firm, missing move	CEO app.	All app.	Private or smaller firm, missing move
	A. High-coverage firms			*B. All firms*		
Negative articles	0.0016**	0.0011**	0.0007**	0.0016***	0.0012***	0.0010**
	(0.001)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)
Positive articles	0.0002	-0.0002	-0.0003	-0.0000	-0.0003	-0.0002
	(0.001)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)
CEO and firm controls	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
N	9,541	9,541	9,541	15,668	15,668	15,668
Number of clusters	751	751	751	1,250	1,250	1,250
Mean of dep. var.	0.0695	0.0300	0.0252	0.0722	0.0311	0.0272

Notes: Quarterly observations between 2000 and 2017. High coverage firms (Panel A) include firms for which the median number of quarterly articles is above the median across all firms. CEO controls include network size, a dummy for whether the CEO was born in the US, the number of qualifications, a quadratic in age, and year of appointment fixed effects. Firm controls include quarterly ROA. All regressions include controls for the total number of articles released in a quarter. Standard errors are clustered at the firm level. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table 7: Average turnover probability, by history

		Short history of neg. coverage		*Long history of neg. coverage*			
		Mean	*SD*	*Mean*	*SD*	*Diff.*	*p-value*
End of:	CEO app.	0.074	0.262	0.084	0.278	-0.01	0.092
	All app.	0.025	0.155	0.039	0.193	-0.014	0.000
CEO moves to:	Private/smaller firm, missing move	0.021	0.143	0.031	0.173	-0.01	0.004

Notes: The sample includes high-coverage firms only, namely firms for which the median number of articles in a quarter is above the median across all firms, and tenure-quarters of CEO appointment between 2 and 10 quarters of tenure. Long histories (first panel) are tenure-quarters where a negative publication was available in more than 50% of the tenure-quarters up to tenure-quarter $t-1$, where a negative publication is a news with sentiment at the bottom 10% of the distribution. include tenure-quarters where a negative publication was available in less than 50% of the tenure-quarters up to tenure-quarter $t-1$.

Table 8: Turnover and news, by history

	(1)	(2)	(3)	(4)	(5)	(6)
	End of:		*CEO moves to:*	*End of:*		*CEO moves to:*
	CEO app.	All app.	Private or smaller firm, missing move	CEO app.	All app.	Private or smaller firm, missing move
	A. Long history of neg. coverage			*B. Short history of neg. coverage*		
Negative articles	0.0022**	0.0016**	0.0011*	-0.0016	0.0003	-0.0005
	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)
Positive articles	-0.0008	-0.0003	-0.0000	-0.0029	-0.0013	-0.0015*
	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)
Sector FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
N	2,659	2,659	2,659	2,683	2,683	2,683

Notes: Quarterly observations between 2000 and 2017. The sample includes 751 high-coverage firms, that is firms for which the median number of articles in a quarter is above the median across all firms, and tenure-quarters of CEO appointment between 2 and 10 quarters of tenure. Long histories (Panel A) are tenure-quarters where a negative publication was available in more than 50% of the tenure-quarters up to tenure-quarter $t-1$, where a negative publication is a news with sentiment at the bottom 10% of the distribution. Short histories (Panel B) include tenure-quarters where a negative publication was available in less than 50% of the tenure-quarters up to tenure-quarter $t-1$. CEO controls include a quadratic in tenure, a quadratic in age, and a female indicator. Firm controls include quarterly ROA. All regressions include controls for the total number of articles released in a quarter. Standard errors are clustered at the sector level. $^{*}p<0.10$, $^{**}p<0.05$, $^{***}p<0.01$.

Table 9: Target moments

Moment	Description		Value
	(a) Average firm profitability by publication state:		
δ_0			6.156
δ_1	$\tilde{q}_{it} = \delta_0 + \delta_1 pub2_{it-1} + \delta_2 pub3_{it-1} + \epsilon_{it}$		−3.089
δ_2			−7.751
	(b) Firm profitability AR(1):		
λ_0	$\tilde{q}_{it} = \lambda_0 + \lambda_1 \tilde{q}_{it-1} + \epsilon_{it}$		0.238
λ_1			0.968
	(c) Survival function:		
$Surviv_j$	Survival function at $t = j$:	$j = 2$	0.931
		$j = 6$	0.745
		$j = 10$	0.595
		$j = 14$	0.535
	(d) Firm profitability by tenure:		
$Avgperf_j$	Average firm performance at $t = j$:	$j = 2$	1.526
		$j = 6$	4.621
		$j = 10$	5.588
		$j = 14$	5.677

Notes: Target moments used for the parameter's estimation through method of simulated moments. $\tilde{q}_{it}$ represents ROA for firm-CEO i at time t in excess of industry performance. $pub2_{it}$ and $pub3_{it}$ are dummies for the second and third tercile in the share of negative news at time t. Time t is in years.

Table 10: Model parameters: calibration

	(1) Pre-set parameters	
δ	Discount factor	0.9
τ	Scale of taste shock	1
	(2) Simulated Method of Moments	
	Distributions	
α_0	Prior mean of CEO ability	2.06
σ_0	Prior st. deviation of CEO ability	4.48
σ_q	Within-CEO st. deviation of firm performance	2.28
$\tilde{\sigma}_q$	Perceived within-CEO st. deviation of firm performance	9.65
	Utility	
κ_1	Utils per unit of firm performance	0.50
κ_2	Utils per unit of public firm performance	0.50
c	Dismissal cost	3.46
	(3) Calibrated to match evidence	
	News selection	
$\mu_{q\|S=1}$	Mean of published firm performance	1.84
ω	Unconditional probability of publication	0.96

Notes: Implied model's parameters. The first block of parameters is pre-set: δ matches Taylor (2010) and τ is normalized to 1. The second block is obtained through simulated method of moments using the moments in Table 9 as targets. The third block is calibrated to match the slope in news coverage for events with different sentiment in Figure 3.

Table 11: Counterfactuals

(1) *Model*	(2) *News selection bias*	(3) *Implied hazard*	(4) *Diff. with baseline*	(5) *Explained gap in turnover*
(A) No bias	0%	0.0382	– 9.69%	
(B) Baseline	12%	0.0423	0%	
(C) F	41%	0.0436	3.07%	15.37%
(D) F × First app.	67%	0.0443	4.73%	23.64%

Notes: *(A) No bias*. Counterfactual simulation, obtained by removing the news selection bias. *(B) Baseline model*. The parameters for the baseline model are in Table 10. *(C) F*. Counterfactual simulation, obtained by simulating the model feeding in the news selection bias estimated for women CEOs. The news selection bias is obtained from Table 3. *(D) F × First app*. Counterfactual simulation, obtained by simulating the model feeding in the news selection bias estimated for women CEOs at their first appointment. The news selection bias is obtained from Tables 4 and 5.

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A Model

A.1 Proofs of propositions

Proof of Proposition 1

Proof. Rewrite $P(S=1|q)$ and $P(S=0|q)$ using Bayes' rule:

$$P(S=1|q) = \frac{P(q|S=1)\cdot P(S=1)}{P(q)}$$

$$P(S=0|q) = \frac{P(q|S=1)\cdot P(S=0)}{P(q)}$$

Therefore:

$$\frac{P(S=1|q)}{P(S=0|q)} = \frac{P(q|S=1)}{P(q|S=0)} \cdot \frac{P(S=1)}{P(S=0)}$$

For fixed $\frac{P(S=1)}{P(S=0)}$, this implies that $\frac{P(q|S=1)}{P(q|S=0)}$ is decreasing in q, and therefore $\frac{P(q|S=0)}{P(q|S=1)}$ is increasing in q.

Denote $f_0(q)$ and $f_1(q)$ the density functions of $P(q|S=0)$ and $P(q|S=1)$. We have:

$$\frac{f_0(q_i)}{f_1(q_i)} \geq \frac{f_0(q_j)}{f_1(q_j)} \ \forall q_i \geq q_j$$

or equivalently:

$$f_0(q_i)f_1(q_j) \geq f_0(q_j)f_1(q_i) \ \forall q_i \geq q_j \tag{6}$$

Integrate both sides of the last expression from the minimum in the range of q to q_j, with respect to q_j:

$$\int_{\min q \in Q}^{q_j} f_0(q_i)\cdot f_1(q_j)dq_j \geq \int_{\min q \in Q}^{q_j} f_0(q_j)\cdot f_1(q_i)dq_j$$

which simplifies to:

$$\frac{f_0(q)}{f_1(q)} \geq \frac{F_0(q)}{F_1(q)} \tag{7}$$

Integrate both sides of equation 6 from q_i to the maximum in the range of q, with respect to q_i:

$$\int_{q_i}^{\max q \in Q} f_0(q_i)\cdot f_1(q_j)dq_j \geq \int_{q_i}^{\max q \in Q} f_0(q_j)\cdot f_1(q_i)dq_j$$

which simplifies to:

$$\frac{1-F_0(q)}{1-F_1(q)} \geq \frac{f_0(q)}{f_1(q)} \tag{8}$$

Combine inequalities 7 and 8 and rearrange terms to obtain:

$$F_0(q) \leq F_1(q)$$

□

Proof of Proposition 2

Proof. W.l.o.g., assume that $E(q_t) = 0$. From Proposition (1), $P(q_t \leq q|S_t = 0) \leq P(q_t \leq q|S_t = 1)$, which implies that $E(q_t|S_t = 0) \geq E(q_t|S_t = 1)$. Therefore, since $E(q_t) = 0$:

$$E(q_t) = E(q_t|S_t = 0) \cdot P(S_t = 0) + E(q_t|S_t = 1) \cdot P(S_t = 1) = 0$$

Since $E(q_t|S_t = 0) \geq E(q_t|S_t = 1)$, it must be $E(q_t|S_t = 1) \leq 0$, which in turn implies that $E(q_t|S_t = 1) \leq E(q_t)$.

□

A.2 Model's predictions

Recall that an executive j is dismissed at tenure time t if $\mu_{\alpha,j}(t) < \mu^*_{\alpha,t}$, where $\mu_{\alpha,j}(t)$ is the posterior belief on the ability of executive j, and $\mu^*_{\alpha,t}$ is the endogenous firing threshold set by the board. Standard results on Bayesian updating with Gaussian distributions imply that:

$$\mu_\alpha(t) = \frac{\tau_0 \alpha_0 + \tau_q (t-1) h(t)}{\tau_\alpha + (t-1)\tau_q} \tag{9}$$

where α_0 is the mean prior ability of an executive, τ_0 is the prior precision, with $\tau_0 = \frac{1}{\sigma_0^2}$, and τ_q is the signal precision, with $\tau_q = \frac{1}{\sigma_q^2}$. $h(t)$ is the average value of the signal up to time t: $h(t) = \frac{\sum_{s=1}^{t-1} q_s}{t-1}$.[18] Equation 9 shows that the posterior mean ability of an executive is an increasing function of the average realized signal up to time $t-1$: a signal above $h(t)$ increases the posterior mean at time $t+1$, whereas a signal below $h(t)$ decreases the posterior mean at time $t+1$. For simplicity, I drop the subscript α from $\mu_{\alpha,j}(t)$ and $\mu^*_{\alpha,t}$, and I set $\mu^*_t = \mu^* \forall t$. Partition the state space M_t of all possible values of $\mu(t)$ and define:

$$M_t^0 = \{\mu(t) \in M_t | \mu(t) > \mu^*\}$$

$$M_t^1 = \{\mu(t) \in M_t | \mu(t) \leq \mu^*\}$$

In every period, a signal $q_t \in Q$ is realized, where q_t is normally distributed and centered around α, the true underlying ability of an executive. Because the performance space Q is continuous, I need to

[18] I ignore the complications arising from news selection, which modifies the average value of the signal up to time t to take into account publication decisions: $\hat{h}(t) = \frac{\sum_{s=1}^{t-1}(q_s|S_s=1)}{\sum_{s=1}^{t-1} I(S_s=1)}$. The posterior mean ability of an executive at time t becomes:

$$\hat{\mu}_\alpha(t) = \frac{\tau_0 \alpha_0 + \tau_q \sum_{s=1}^{t-1} I(S_s = 1)\hat{h}(t)}{\tau_\alpha + \sum_{s=1}^{t-1} I(S_s = 1)\tau_q}$$

Because the intuition is analogous to the standard case, I provide the proof for the standard case only.

define a negative news. Partition the space Q and define the subset Q^L of negative news such that:

$$\log\left\{\frac{P(q_t \in Q^L | \mu(t) \in M_t^0)}{P(q_t \in Q^L | \mu(t) \in M_t^1)}\right\} < 0 \tag{10}$$

Inequality 10 states that the values in M_t^0 become less likely than the values in M_t^1 when $q_t \in Q^L$ is realized.

Prediction 1: *Conditional on tenure t, the probability of turnover increases as $h(t)$ decreases.*

Proof. Consider two histories $h_1(t)$ and $h_2(t)$ such that $h_1(t) < h_2(t)$. Conditional on the prior, the two posterior beliefs $\mu_1(t)$ and $\mu_2(t)$ are known at time t, and $\mu_1(t) < \mu_2(t)$. Define the log likelihood ratio $\lambda_{j,t}$ as the relative probability that an executive is retained:

$$\lambda_{j,t} = \log\frac{P(\mu_j(t) \in M_t^0)}{P(\mu_j(t) \in M_t^1)}$$

The log likelihood ratios $\lambda_{1,t}$ and $\lambda_{2,t}$ will be:

$$\lambda_{1,t} = \log\frac{P(\mu_1(t) \in M_t^0)}{P(\mu_1(t) \in M_t^1)} < \lambda_{2,t} = \log\frac{P(\mu_2(t) \in M_t^0)}{P(\mu_2(t) \in M_t^1)} \tag{11}$$

where inequality 11 follows from the fact that $\mu_1(t) < \mu_2(t)$, so that $P(\mu_1(t) < \mu^*) > P(\mu_2(t) < \mu^*)$. □

Prediction 2: *Conditional on tenure t, the sensitivity of turnover to the arrival of a negative news increases as $h(t)$ decreases.*

Proof. $q_t \in Q^L$ realizes at time t. Set $\mu^* < \mu_1(t) < \mu_2(t)$, so that the two executives have not yet been dismissed at time t. Using the definition of conditional probability, we have:

$$P(\mu(t) \in M_t^0 | q \in Q^L) = \frac{P(q_t \in Q^L | \mu(t) \in M_t^0) P(\mu(t) \in M_t^0)}{P(q_t \in Q^L)}$$

$$P(\mu(t) \in M_t^1 | q_t \in Q^L) = \frac{P(q_t \in Q^L | \mu(t) \in M_t^1) P(\mu(t) \in M_t^1)}{P(q_t \in Q^L)}$$

And therefore:

$$\frac{P(\mu(t) \in M_t^0 | q \in Q^L)}{P(\mu(t) \in M_t^1 | q \in Q^L)} = \frac{P(q_t \in Q^L | \mu(t) \in M_t^0)}{P(q_t \in Q^L | \mu(t) \in M_1)} \frac{P(\mu(t) \in M_t^1)}{P(\mu(t) \in M_t^1)}$$

Therefore the log likelihood ratio at time $t+1$ can be expressed as:

$$\lambda_{t+1} = \lambda_t + b_t$$

where $b_t = \log \frac{P(q_t \in Q^L | \mu(t) \in M_t^0)}{P(q_t \in Q^L | \mu(t) \in M_t^1)} < 0$ is independent of the prior belief. Using 11, we have:

$$\lambda_{1,t+1} = \lambda_{1,t} + b_t < \lambda_{2,t+1} = \lambda_{2,t} + b_t$$

Define λ^* as the log-likelihood threshold such that an executive is fired, where $\lambda^* < 0$. Since at t the executive has not yet been fired, it must be:

$$\lambda^* < \lambda_{1,t} < \lambda_{2,t}$$

Set $\lambda_{1,t} = \lambda^* + E_1$ and $\lambda_{2,t} = \lambda^* + E_1$, with $E_1, E_2 > 0$ and $E_1 < E_2$. Then at time $t+1$, executive 1 is fired if $\lambda_{1,t+1} < \lambda^*$, which implies $E_1 < -b_t$. Executive 2 is fired if $E_2 < -b_t$. Because $E_1 < E_2$, executive 1 is more likely to be fired in period $t+1$ relative to executive 2. □

A.3 News selection parametrization

The distributional assumptions of the learning model and the structure imposed by the news selection rule give enough conditions to set the parameters of the distributions and produce simulations.
Definition 1 states that the publication rule is such that $\frac{P(S=1|q)}{P(S=0|q)}$ is decreasing in q.
Using Bayes' rule:

$$P(S=1|q) = \frac{P(q|S=1) \cdot P(S=1)}{P(q)}$$

$$P(S=0|q) = \frac{P(q|S=1) \cdot P(S=0)}{P(q)}$$

Setting $\omega = P(S=1)$, the two expressions imply that the odds ratio can be rewritten as:

$$\frac{P(S=1|q)}{P(S=0|q)} = \frac{P(q|S=1)}{P(q|S=0)} \cdot \frac{P(S=1)}{P(S=0)} = \frac{P(q|S=1)}{P(q|S=0)} \cdot \frac{\omega}{(1-\omega)}$$

The unconditional probability $P(q)$ is a mixture of two distributions:

$$P(q) = P(S=1) \cdot P(q|S=1) + P(S=0) \cdot P(q|S=0) = \omega \cdot P(q|S=1) + (1-\omega) \cdot P(q|S=0)$$

Under the assumption that $P(q|S=1)$ and $P(q|S=0)$ are normal distributions, then $P(q)$ is also a normal distribution. Assume that:

$$P(q|S=0) \sim N(\mu_0, \sigma_0^2)$$

$$P(q|S=1) \sim N(\mu_1, \sigma_1^2)$$

Set $\sigma_0^2 = \gamma \sigma_1^2$. Then we have:

$$\frac{P(S=1|q)}{P(S=0|q)} = \sqrt{\gamma} e^{\frac{1}{2\sigma_1}\left[\left(\frac{q-\mu_0}{\sqrt{\gamma}}\right)^2 - (q-\mu_1)^2\right]}$$

The right hand side is decreasing in q if the exponent is decreasing in q. Therefore, the following condition must be met:

$$q\left(\frac{1}{\sqrt{\gamma}}-1\right)<\mu_0-\mu_1$$

Setting $\gamma=1$, the condition is met for every q if $\mu_0-\mu_1>0$.[19] Note, moreover, that we must choose values ω, μ_0, and μ_1 such that:

$$E(q)=\mu_1\cdot\omega+\mu_0\cdot(1-\omega)$$

A.4 Model solution

State space At each tenure time t, the state space is represented by realized performance signals $q_1,...,q_{t-1}$ and publication decisions $S_t,...,S_{t-1}$. For private learning, the average of the signals $q_1,...,q_{t-1}$ is a sufficient statistic for past performance realizations. The statement is not true for public learning. In fact, at every point in time public beliefs are updated using the average *published* signals $q_1,...,q_{t-1}$, which depend on the realization of the sequence of random variables $S_t,...,S_{t-1}$. Keeping track of the full history of published $q_1,...,q_{t-1}$ would imply that, for a discretized performance state of K_q points and a discretized public performance state of $K_{q|S}$ points, at each point in time the state space has dimension $K_q\times K_{q|S}^{t-1}$. To avoid such a high-dimensional state space, I simplify the problem as follows. First, I need to keep track of the history of publication decisions $S_t,...,S_{t-1}$, as the variance of posterior public beliefs depends on how many times S_t has turned on. To summarize past publications, at each point in time I calculate the average number of publications up to time $t-1$: $\bar{S}_t=\sum_{j=1}^{t-1}\frac{S_j}{t-1}$, and then discretize the interval [0,1] into K_S equally spaced points. I discretize the continuous state space of firm performance using a grid of K_q equally spaced points. Recall that the bias introduced by news selection makes the performance state look "worse": in Figure 7, the distribution of published events is shifted to the left relative to the true distribution. Therefore, I map the true performance space K_q to the published performance space K_q^S by re-centering K_q according to the bias introduced by news selection. The simplification I introduce implies that at each point in time the state space has dimension $K_q\times K_S$.

Turnover probability I start from time T, when learning is complete. Recall that at time T the asymptotic choice-specific value functions are:

$$V^K(\mathbf{x_T})=E_T(\kappa_1 q_T|\mathbf{x_T})+E_T(\kappa_2\hat{q}_T|\mathbf{x_T})+\delta V_{T+1}(\mathbf{x_{T+1}})|\mathbf{x_T})+\epsilon^S=\bar{V}^K+\epsilon^K$$

$$V_T^D(\mathbf{x_T})=-c+V_0(\mathbf{x_0})+\epsilon^D=\bar{V}^D+\epsilon^D$$

and the optimization problem is $V(\mathbf{x})=\max_{d\in\{0,1\}}\left(V^K(\mathbf{x}),V^Q(\mathbf{x})\right)$. The taste shocks are distributed with

[19] Some values of μ_0,μ_1 and σ_0 may introduce kurtosis in $P(q)$. In order to avoid bimodality in $P(q)$ one must set $\mu_0-\mu_1<2\sigma_0$.

a Type 1 Extreme Value distribution with scale parameter τ, which has cumulative distribution function $\Lambda(x) = \frac{\exp(x)}{1+\exp(x)}$. At time T, the probability of keeping the CEO given the state variables is:

$$P(keep_T|\mathbf{x_T}) = Pr(V_T^K > V_T^D|q_1,...,q_{T-1},y_1,...,y_{T-1},S_1,...,S_{T-1}) =$$
$$P(E_T(\kappa_1 q_T|q_1,...,q_{T-1}) + E_T(\kappa_2\hat{q}_T|y_1,...,y_{T-1},S_1,...,S_{T-1}) + \delta E_T V_{T+1}(\mathbf{x_{T+1}})|\mathbf{x_T}) + \epsilon^K > -c + V_0(\mathbf{x_0})) + \epsilon^D) =$$
$$\Lambda\left(\frac{E_T(\kappa_1 q_T|q_1,...,q_{T-1}) + E_T(\kappa_2\hat{q}_T|y_1,...,y_{T-1},S_1,...,S_{T-1}) + \delta E_T V_{T+1}(\mathbf{x_{T+1}})|\mathbf{x_T}) + c - V_0(\mathbf{x_0}))}{\tau}\right) \tag{12}$$

The expectations $E_T(q_T|q_1,...,q_{T-1})$ and $E_T(\hat{q}_T|q_1,...,q_{T-1},S_1,...,S_{T-1})$ can be calculated using the standard results in Bayesian inference with Gaussian distributions.

For a general period t, the probability of keeping the CEO is:

$$P(keep_t|\mathbf{x_t}) = \Lambda\left(\frac{E_t(\kappa_1 q_t|q_1,...,q_{t-1}) + E_T(\kappa_2\hat{q}_t|y_1,...,y_{t-1},S_1,...,S_{t-1}) + \delta E_t V_{t+1}(\mathbf{x_{t+1}}|\mathbf{x_t}) + c - V_0(\mathbf{x_0})}{\tau}\right) \tag{13}$$

Calculating $E_t V_{t+1}(\mathbf{x_{t+1}})|\mathbf{x_t})$ requires integrating expectations of future performance realizations, publications, and taste shocks:

$$E_t V_{t+1}(\mathbf{x_{t+1}})|\mathbf{x_t}) = E_{S_t}E_{q_t|S_t}E_{\epsilon|q_t,S_t}V_{t+1}(\mathbf{x_{t+1}})|\mathbf{x_t}) = E_{S_t}E_{q_t|S_t}E_{\epsilon|q_t,S_t}\left(max\{\bar{V}_{t+1}^S + \epsilon_{t+1}^S, \bar{V}_{t+1}^D + \epsilon_{t+1}^D\}\right) \tag{14}$$

Fix the state space of past publications, summarized by $\bar{S}_t = \sum_{j=1}^{t-1}\frac{S_j}{t-1}$ as described above. Then for every grid point $k_S \in K_S$ in the publication state space:

$$\int_q \tau \log\left(\exp\left(\frac{\bar{V}_{t+1}^S}{\tau}\right) + \exp\left(\frac{\bar{V}_{t+1}^D}{\tau}\right)\right) f(q_t|q_1,...,q_{t-1})dq_t = \sum_{k_q \in K_q} \log\left(\exp\left(\frac{\bar{V}_{t+1}^S}{\tau}\right) + \exp\left(\frac{\bar{V}_{t+1}^D}{\tau}\right)\right) P(q_t^{k_q}|q_1,...,q_{t-1}) \tag{15}$$

Assuming a taste shock with Type 1 Extreme Value distribution allows having a closed form for the expectation in Equation 14. Note that going from equation 14 to 15 for a given publication state requires that $E_{q_t|S_t}(\cdot) = E_{q_t}(\cdot)$, which follows from the assumption that the Board of Directors does not learn CEO quality through publications, and therefore the Board's expectation of firm performance is independent of past publications. However, the expected value of the current CEO, $E_t V_{t+1}$ in Equation 14, depends on the publication state k_s, because public beliefs affect the value of the current firm-CEO match.

Transition probabilities The expression $P(q_t^{k_q}|q_1,...,q_{t-1})$ in Equation 15 represents the Board's perceived probability of the CEO realizing performance k_q at time t, given past performance $q_1,...,q_{t-1}$.

$$P(q_t^{k_q}|q_1,...,q_{t-1}) = \Phi\left(\frac{q_t^{k_q} + 0.5 \times kstep - E(q_t|q_1,...,q_{t-1})}{\sqrt{\Omega_{t-1}}}\right) - \Phi\left(\frac{q_t^{k_q} - 0.5 \times kstep - E(q_t|q_1,...,q_{t-1})}{\sqrt{\Omega_{t-1}}}\right)$$

where $\Omega_{t-1} = \left(\tau_\alpha + (t-1)\tau_{\tilde{q}}\right)^{-1}$, $kstep$ is the distance between grid points, and $q_t^{k_q}$ is the value of firm

performance at grid point k_q. Since past performance realizations are summarized by the average realized performance up to $t-1$, and I have discretized the performance state, I use the transition probability matrix of average performance moving from grid point $k_{j'}$ at $t-1$ to point k_j at time t:

$$P(\bar{q}_t^{k_{j'}}|\bar{q}_{t-1}^{k_j}) = \Phi\left(\frac{t\cdot(\bar{q}_t^{k_j}+0.5\times kstep)-(t-1)\bar{q}_{t-1}-E(q_t|q_1,...,q_{t-1})}{\sqrt{\Omega_{t-1}}}\right) - \Phi\left(\frac{t\cdot(\bar{q}_t^{k_j}-0.5\times kstep)-(t-1)\bar{q}_{t-1}-E(q_t|q_1,...,q_{t-1})}{\sqrt{\Omega_{t-1}}}\right) \tag{16}$$

Model solution I use value function iteration to solve the dynamic programming problem numerically. The algorithm is similar to Rust (1987).
I guess a value for V_0, that is the value from hiring a CEO:

1. I start from time T and solve for the asymptotic value functions V^K and V^D using value function iteration. I set $T = 130$.

2. I use backwards recursion to solve for the choice-specific value functions V_t^K and V_t^D at every $t = 1,...,T$.

3. I obtain V_0.

I iterate steps 1–3 and stop at the i-th iteration whenever $|V_0^i - V_0^{i-1}| < 10^{-15}$.

Media Focus and Executive Turnover:
Consequences for Female Leadership

Valeria Ferraro

Online Appendix

B Additional Figures

Feb 2, 2005
Dow Jones News Service

CITY OF INDUSTRY, Calif. (Dow Jones) -- Hot Topic Inc.'s (HOTT) same-store sales fell 2.5% in January, as a shift in the timing of holidays led to weaker comparisons in the last two weeks of the month. [...]
The teen apparel and music retailer said it expects to meet analysts' mean estimate for earnings of 38 cents a share in the fourth quarter. [...]

Entity id	Relevance	Source	Date	Time	Story group	Sentiment
HOTT	100	DJNS	2feb2006	10:59 AM	revenues	47

(a) Negative news

Oct 8, 2003
Market News Publishing

CITY OF INDUSTRY, Calif. -- [...] California-based Hot Topic said that comparable store sales for the period increased 9.0% from fiscal September 2002. The company added that net sales for the month of September 2003 increased 31% to $48.9 million from net sales of $37.4 million posted in the year ago period. [...]

Entity id	Relevance	Source	Date	Time	Story group	Sentiment
HOTT	100	DJNS	8oct2006	9:15 AM	earnings	83

(b) Positive news

Figure B.1: News examples

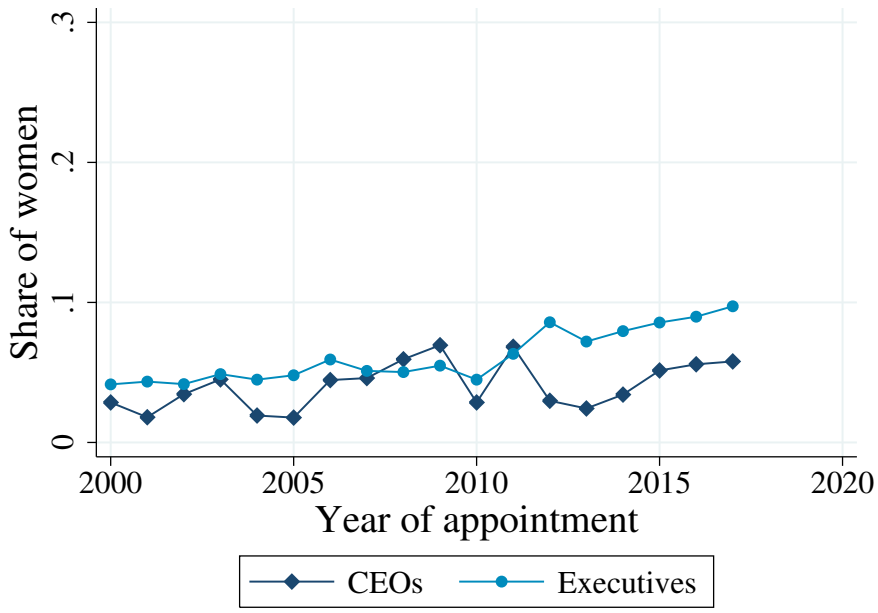
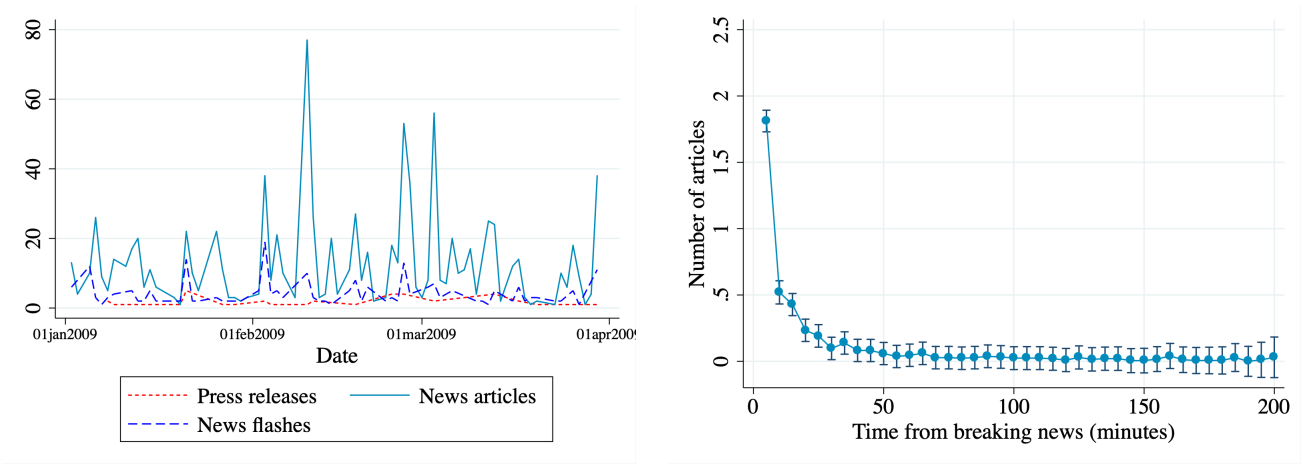


Figure B.2: Share of female executives, by year of appointment

Notes: Executives include Chairs, CEOs, Presidents, CFOs, COOs, and other Chief Officers.

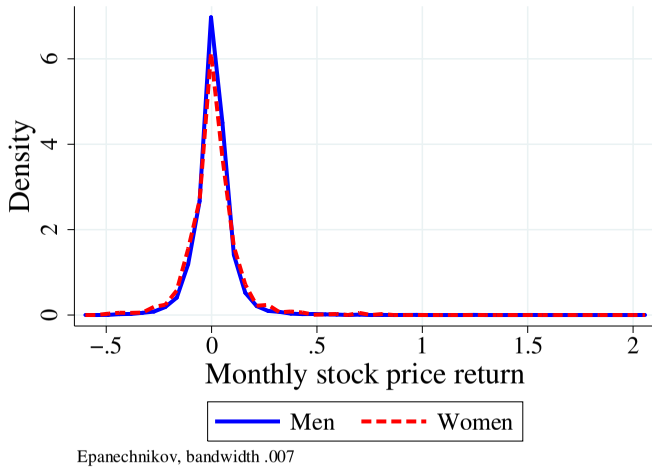


(a) Press releases and news

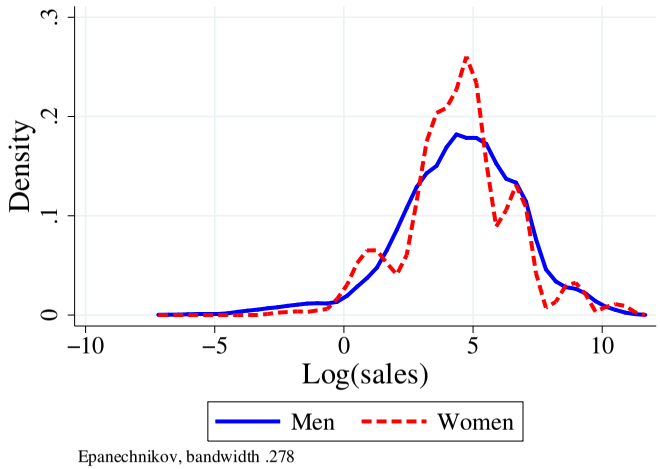
(b) News articles after breaking news

Figure B.3: News data

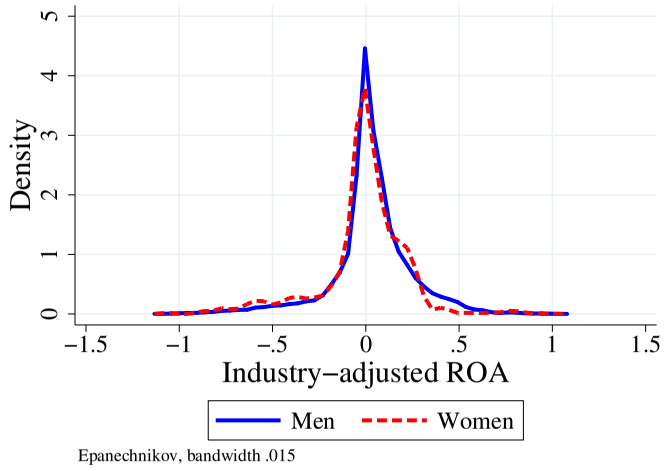
Notes: General Motors, period January-March 2009. (a) Number of press releases, full articles, and news flashes released over the period January-March 2009. (b) Average number of full articles and news flashes released after the first news release.



(a) Monthly stock price return



(b) Log(sales)



(c) Industry-adjusted ROA

Figure B.4: Firm performance

Notes: (a) Monthly stock price returns (Source: CRSP) (b) Log(sales) (Source: Compustat) (c) Industry-adjusted Return on Assets (Source: Compustat). Quarterly observations between 2000 and 2017. Monthly stock price returns in Figure (a) are averaged over the corresponding quarter. Industry-adjusted Return on Assets in Figure (c) is calculated as quarterly ROA minus average industry ROA over the corresponding quarter.

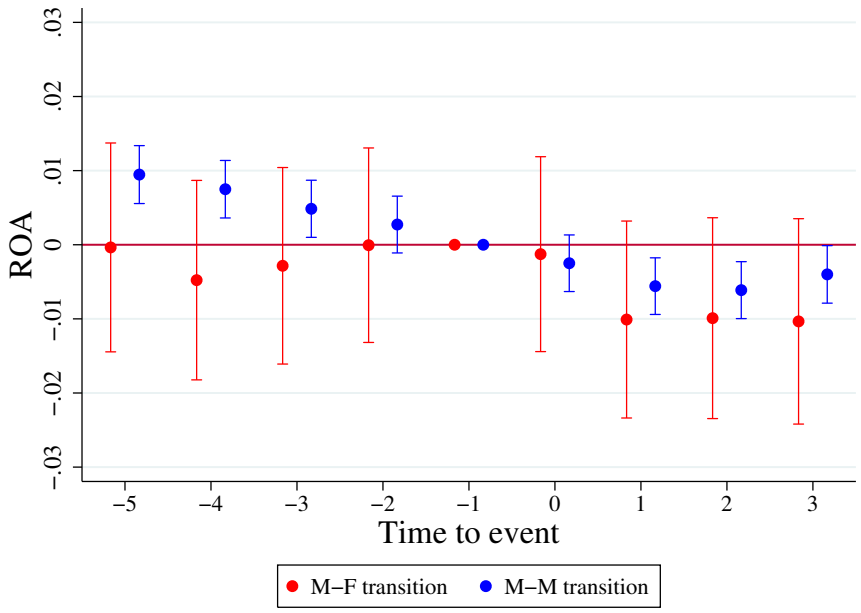


Figure B.5: Firm performance around appointment

Notes: Return on Assets around CEO appointment. Coefficients and 95% confidence intervals from a regression of quarterly ROA on year fixed effects, firm fixed effects, and dummies for the leads and lags from the transition event. Standard errors are clustered at the firm level. The sample includes 200 male-to-female transition events and 3,293 male-to-male transition events.

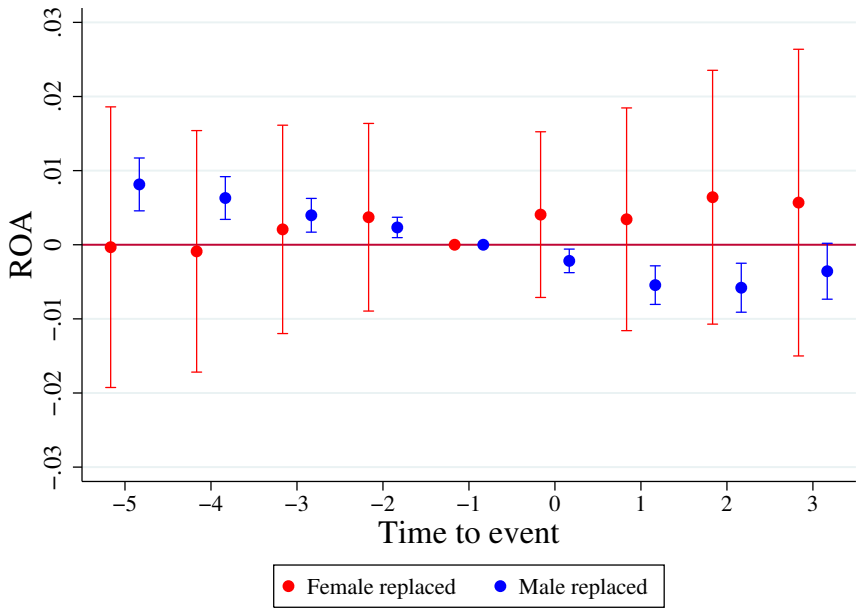
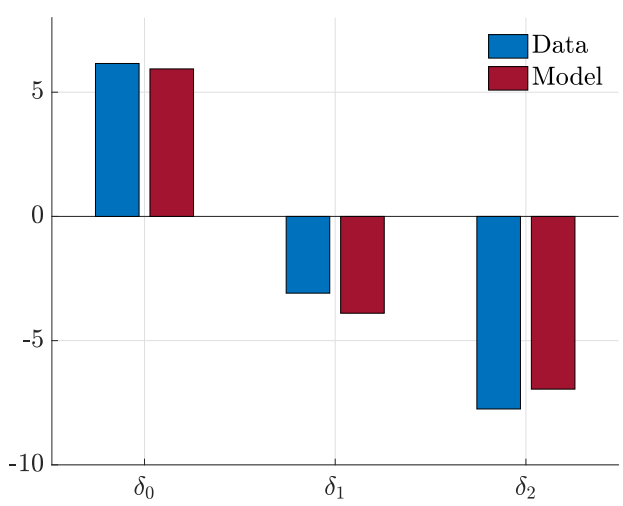
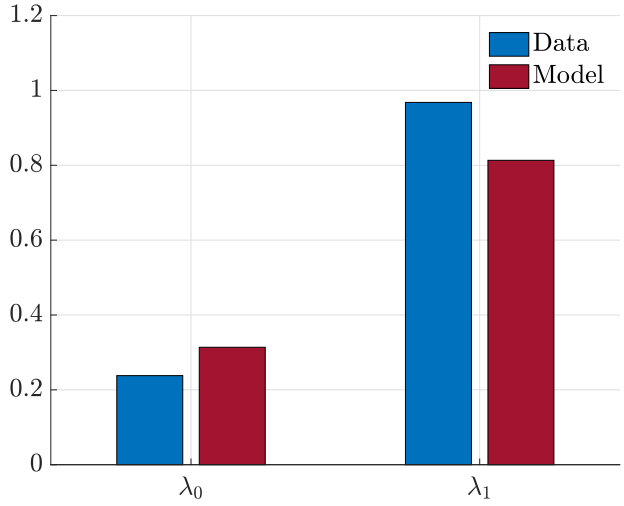


Figure B.6: Firm performance around replacement

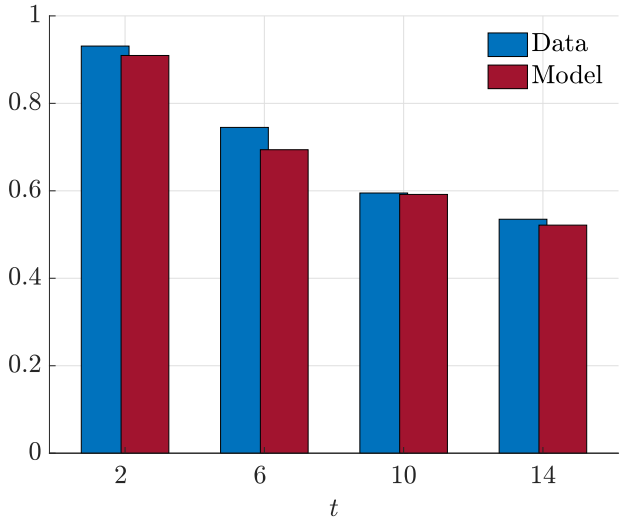
Notes: Return on Assets around CEO replacement. Coefficients and 95% confidence intervals from a regression of quarterly ROA on year fixed effects, firm fixed effects, and dummies for the leads and lags from the replacement event. Standard errors are clustered at the firm level. The sample includes 120 female replacement events and 3,493 male replacement events.



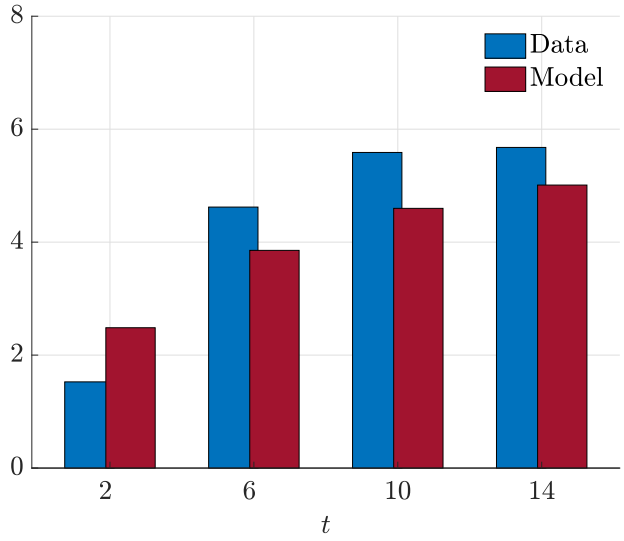
(a) Profitability by publication state



(b) Profitability $AR(1)$



(c) Survival function



(d) Profitability

Figure B.7: Model fit: Target moments

Notes: (a) Profitability by publication state. The coefficients δ_0, δ_1, and δ_2 are obtained from the regression $q_{it} = \delta_0 + \delta_1 pub2_{it-1} + \delta_2 pub3_{it-1} + \epsilon_{it}$ where q_{it} is industry-adjusted ROA for firm i in quarter t, and $pub2_{it}$ and $pub3_{it}$ are two dummies for whether the history of negative publications in firm i and quarter t belong to the second or third tercile. (b) Profitability $AR(1)$. The coefficients λ_0 and λ_1 are obtained from the $AR(1)$ regression $q_{it} = \lambda_0 + \lambda_1 q_{it-1} + \epsilon_{it}$. (c) Survival function. Survival function at different tenure times. (d) Profitability. Average firm profitability at different tenure times.

C Additional Tables

Table C.1: Comparison between unmatched and matched positions and firms

	Unmatched			Matched				
	Mean	Standard deviation	N	Mean	Standard deviation	N	Difference	p-value
Panel A. Individual characteristics								
Female	0.02	0.141	100	0.043	0.202	3,026	-0.023	0.267
Age	51.156	8.977	77	52.6	8.174	2,970	-1.444	0.127
Appointed after 2010	0.41	0.494	100	0.527	0.499	3,026	-0.117	0.021
Born in the US	0.778	0.424	27	0.919	0.273	1,329	-0.141	0.009
Bachelor's degree	0.287	0.455	87	0.288	0.453	2,756	-0.001	0.982
Master's/MBA/Professional degree	0.425	0.497	87	0.449	0.497	2,756	-0.024	0.664
Doctorate degree	0.149	0.359	87	0.152	0.359	2,756	-0.003	0.954
Number of qualifications	2.033	1.326	30	1.919	1.09	2,070	0.114	0.571
Appointment duration (days)	676.068	693.603	74	695.772	764.012	2,749	-19.704	0.826
Tenure in company (years)	3.217	3.962	30	6.569	8.338	2,070	-3.352	0.028
Network size	920.798	1338.01	99	1175.933	1429.706	2,970	-255.135	0.080
Total number of boards	1.867	1.57	30	1.936	1.649	2,029	-0.069	0.818
Number of positions			100			3,026		
Panel B. Board characteristics								
Gender ratio	0.97	0.08	30	0.91	0.11	2,070	0.06	0.001
Number of directors	6.90	1.52	30	8.45	2.50	2,070	-1.55	0.001
Panel C. Firm characteristics								
Assets	2,243.82	8,572.30	38	7,997.51	72,424.21	2,449	-5753.69	0.624
Employees	3.22	10.04	37	8.43	28.77	2,376	-5.21	0.271
Sales	1,227.37	4,300.95	38	2,597.52	10,289.15	2,432	-1370.15	0.413
Gross profits	501.79	2,154.67	38	845.87	3,383.40	2,432	-344.09	0.532
Market value	3,311.84	17,723.33	36	3,660.20	16,344.71	2,216	-348.37	0.899
Primary sector	0.08	0.28	96	0.14	0.35	2,870	-0.06	0.104
Consumer sector	0.17	0.38	96	0.15	0.36	2,870	0.02	0.664
Service sector	0.75	0.44	96	0.71	0.46	2,870	0.04	0.369
Number of firms			75			2,039		

Notes: Source: Panel A and B: BoardEx, 2000-2017, Panel C: Compustat, 2000-2017. Individual and board characteristics are measured in the year of the appointment (except *Appointment duration*), whereas firm characteristics are measured the year before the appointment.

Table C.2: CEOs: Differences in news coverage

Dependent variable: News coverage (z-scores)					
	(1)	(2)	(3)	(4)	(5)
Female	0.032	−0.005	0.314***	0.327***	0.387***
	(0.058)	(0.044)	(0.109)	(0.111)	(0.117)
Network size		0.000***	−0.000	−0.000	−0.000*
		(0.000)	(0.000)	(0.000)	(0.000)
Born in the US		0.035*	−0.029	−0.044	−0.048
		(0.020)	(0.101)	(0.098)	(0.099)
Number of qualifications		0.003	-0.015	−0.022	−0.048
		(0.010)	(0.049)	(0.047)	(0.048)
Age		0.019	0.026	0.033	0.010
		(0.014)	(0.029)	(0.029)	(0.029)
Age sq.		−0.000	−0.000	−0.000	−0.000
		(0.000)	(0.000)	(0.000)	(0.000)
Tenure		−0.007***	−0.004	−0.004	−0.004
		(0.002)	(0.004)	(0.004)	(0.004)
Tenure sq.		0.000***	0.000	0.000	0.000
		(0.000)	(0.000)	(0.000)	(0.000)
Appointment news=1				0.213***	0.212***
				(0.028)	(0.029)
Resignation news=1				0.442***	0.448***
				(0.066)	(0.067)
Sentiment score				0.000	0.000
				(0.001)	(0.001)
Number of listed boards					0.066*
					(0.038)
Tenure in company					−0.010**
					(0.004)
Year FE	Y	Y	Y	Y	Y
Year of appointment FE	N	Y	Y	Y	Y
Firm FE	N	N	Y	Y	Y
N	18703	18703	18703	18703	18300

Notes: Observations are news events released between 2000 and 2017. Every news event specifically mentions the CEO as the primary individual involved in the news event. The dependent variable is represented by the total number of articles for a news event, standardized into z-scores. Standard errors are clustered at the position level. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table C.3: Other Chief Officers: Differences in news coverage

Dependent variable: News coverage (z-scores)								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	CFOs/COOs				Other Chief Officers (CAOs, CMOs, CTOs)			
Female	0.031	−0.003	0.355**	0.263**	0.037	−0.000	0.238+	0.231+
	(0.052)	(0.054)	(0.166)	(0.135)	(0.086)	(0.090)	(0.179)	(0.174)
Network size		0.000***	−0.000	−0.000		0.000**	−0.000+	−0.000+
		(0.000)	(0.000)	(0.000)		(0.000)	(0.000)	(0.000)
Born in the US		−0.001	−0.305***	−0.191**		0.039	−0.404	−0.417
		(0.035)	(0.107)	(0.082)		(0.062)	(0.351)	(0.355)
Number of qualifications		0.016	0.091**	0.075**		−0.040	−0.092	−0.076
		(0.014)	(0.040)	(0.035)		(0.033)	(0.107)	(0.106)
Age		0.038	0.163**	0.182***		0.015	0.125	0.152+
		(0.024)	(0.080)	(0.065)		(0.029)	(0.104)	(0.102)
Age sq.		−0.000	−0.002**	−0.002***		−0.000	−0.001	−0.001+
		(0.000)	(0.001)	(0.001)		(0.000)	(0.001)	(0.001)
Tenure		−0.008**	0.002	0.001		−0.001	0.026	0.024
		(0.003)	(0.004)	(0.003)		(0.007)	(0.032)	(0.029)
Tenure sq.		0.000***	0.000**	0.000		0.000	0.000+	0.000
		(0.000)	(0.000)	(0.000)		(0.000)	(0.000)	(0.000)
COO=1		−0.011	0.089	0.102				
		(0.040)	(0.093)	(0.077)				
Appointment news=1				0.786***				0.445+
				(0.061)				(0.321)
Resignation news=1				1.576***				0.680+
				(0.265)				(0.425)
Sentiment score				−0.000				0.006
				(0.002)				(0.027)
Year FE	Y	Y	Y	Y	Y	Y	Y	Y
Year of appointment FE	N	Y	Y	Y	N	Y	Y	Y
Firm FE	N	N	Y	Y	N	N	Y	Y
Observations	11295	11295	11295	11295	1271	1271	1271	1271

Notes: Observations are news events released between 2000 and 2017. Every news event specifically mentions an executive as the primary individual involved in the news event. The dependent variable is represented by the total number of articles for a news event, standardized into z-scores. Standard errors are clustered at the position level. $*p < 0.10$, $**p < 0.05$, $***p < 0.01$. $+p < 0.20$ $*p < 0.10$, $**p < 0.05$, $***p < 0.01$.

Table C.4: Differences in firm performance

	(1)	(2)	(3)	(4)
		A. Stock price returns		
	OLS	Q(0.25)	Q(0.5)	Q(0.75)
Female	-0.008	-0.005	-0.001	0.001
	(0.017)	(0.004)	(0.003)	(0.006)
CEO char.	Y	Y	Y	Y
Firm size	Y	Y	Y	Y
Firm FE	Y	N	N	N
Year FE	Y	Y	Y	Y
N	15,742	15,742	15,742	15,742
		B. Log(sales)		
	OLS	Q(0.25)	Q(0.5)	Q(0.75)
Female	-0.020	0.256***	0.309***	0.401***
	(0.053)	(0.088)	(0.055)	(0.056)
CEO char.	Y	Y	Y	Y
Firm size	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Firm FE	Y	N	N	N
N	18,133	18,133	18,133	18,133
		C. Industry-adjusted ROA		
	OLS	Q(0.25)	Q(0.5)	Q(0.75)
Female	0.031	0.002	-0.012	-0.020**
	(0.028)	(0.004)	(0.008)	(0.009)
CEO char.	Y	Y	Y	Y
Firm size	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Firm FE	Y	N	N	N
N	13,281	13,281	13,281	13,281

Notes: Quarterly observations between 2000 and 2017. The dependent variable is represented by quarterly stock price returns (Panel A), the logarithm of quarterly sales (Panel B), and industry-adjusted Return on Assets (Panel C). Quarterly stock price returns are calculated as monthly returns averaged over the corresponding quarter. Industry-adjusted ROA is calculated as quarterly ROA minus quarterly average industry ROA. OLS regression in column 1 and quantile regressions in columns 2–4. CEO characteristics include a quadratic in age and a quadratic in tenure. Firm size is represented by the the logarithm of assets. Standard errors are clustered at the position level in column 1 and bootstrapped in columns 2–4. $*p < 0.10$, $**p < 0.05$, $***p < 0.01$.

Table C.5: Turnover and news: Cox proportional hazard

	(1)	(2)	(3)	(4)	(5)	(6)
	End of:		*CEO moves to:*	*End of:*		*CEO moves to:*
	CEO app.	All app.	Private or smaller firm, missing move	CEO app.	All app.	Private or smaller firm, missing move
	A. High-coverage firms			*B. All firms*		
Negative articles	0.0165	0.0561**	0.0444*	0.0209	0.0581***	0.0549**
	(0.0141)	(0.0221)	(0.0242)	(0.0138)	(0.0207)	(0.0232)
Positive articles	-0.0189	-0.0290	-0.0293	-0.0315*	-0.0632**	-0.0637*
	(0.0174)	(0.0316)	(0.0338)	(0.0174)	(0.0310)	(0.0339)
Female	0.2218	0.1766	-0.1737	0.2214	0.1815	-0.0750
	(0.1839)	(0.2863)	(0.3515)	(0.1415)	(0.2127)	(0.2480)
ROA	-0.1260	-0.4163**	-0.4351**	-0.0299	-0.1590	-0.1713
	(0.1384)	(0.1833)	(0.1962)	(0.0856)	(0.1058)	(0.1083)
CEO controls	Y	Y	Y	Y	Y	Y
Sector FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
N	9,673	9,673	9,673	15,944	15,944	15,944

Notes: Quarterly observations between 2000 and 2017. High coverage firms (Panel A) include firms for which the median number of articles in a quarter is above the median across all firms. CEO controls include network size, the number of qualifications, a quadratic in age. All regressions include controls for the total number of articles released. Standard errors are clustered at the firm level. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

D Additional Results

D.1 Addressing potential biases in news coverage results

In order to understand news selection decisions, it would be ideal to check how the *unconditional* distribution of events maps to the distribution of *reported* news events. The crucial issue is that observing the unconditional distribution of all events in a firm is not possible, and one would need to make assumptions on the shape of such distribution. The main advantage of measuring coverage decisions using the sample of reported events is to avoid imposing structure on the underlying unconditional distribution. Moreover, looking at the extensive margin of publication decisions – rather than the intensive margin – would carry the risk of confounding media decisions with firms' decisions. In fact, much of the information reported by financial outlets is day-to-day information released by the company itself. In order to better understand whether news media decisions significantly differ at the extensive margin between male- and female-headed firms, I check whether the number of news events released in a given unit of time differs for male- versus female-headed firms. The underlying assumption is that the unconditional distribution of all events is the same across male- and female-headed firms. Such assumption is supported by empirical evidence: the data do not reveal any differences in performance between male- and female-led firms. I then aggregate news events at the quarterly level and estimate the equation:

$$\text{Number of news events}_{it} = \alpha + \text{CEO char}_{it}\,\delta + \text{Perf}_{it}\,\eta + \phi_{f(it)} + \tau_t + \nu_{it} \tag{17}$$

where Number of news events$_{it}$ is the number of events linked to CEO i in quarter t, CEO char$_{it}$ are CEO characteristics, including a quadratic in age and in tenure, Perf$_{it}$ are performance controls, and $\phi_{f(it)}$ and τ_t are firm and time fixed effects. I estimate both OLS and quantile regressions. Because I cannot control for sector or firm fixed effects when running quantile regressions, I add controls for firm size, represented by the logarithm of assets. I focus on performance-related news events only, and exclude events related to acquisition and mergers, legal and labor issues, and products and services. I also exclude all performance events related to bankruptcy.[20] In Table D.1 I present coefficient estimates for the OLS regression in Equation 17 and quantile regressions, separately for positive and negative events. On average, there is no significant difference in the number of news events released for male- and female-led firms, neither when looking at positive or negative events. A small, positive difference shows up in the quantile regressions for the sample of negative events: at the 75th percentile of the distribution, the difference for female-headed firms is 0.14 news events.

[20] I run the same analysis on the full sample of events, and find very similar results.

Table D.1: Number of negative and positive news events in a quarter

	(1)	(2)	(3)	(4)
	A. Negative events			
	OLS	Q(0.25)	Q(0.5)	Q(0.75)
Female	0.377	0.021**	0.120***	0.142***
	(0.235)	(0.009)	(0.034)	(0.044)
CEO char.	Y	Y	Y	Y
Firm performance	Y	Y	Y	Y
Firm size	N	Y	Y	Y
Firm FE	Y	N	N	N
Year FE	Y	Y	Y	Y
N	18,133	18,133	18,133	18,133
	B. Positive events			
	OLS	Q(0.25)	Q(0.5)	Q(0.75)
Female	-0.001	-0.010	-0.008	0.049
	(0.181)	(0.023)	(0.038)	(0.053)
CEO char.	Y	Y	Y	Y
Firm performance	Y	Y	Y	Y
Firm size	N	Y	Y	Y
Firm FE	Y	N	N	N
Year FE	Y	Y	Y	Y
N	18,133	18,133	18,133	18,133

Notes: Quarterly observations between 2000 and 2017. The dependent variable is represented by the number of news events in a quarter. Negative events are represented by news events at the bottom 10% of the sentiment distribution (Panel A), whereas positive events belong to the top 90% of the sentiment distribution. OLS regression in column 1 and quantile regressions in columns 2–4. The estimating specification is Equation 17 in the text. CEO characteristics include a quadratic in age and a quadratic in tenure. Firm performance is represented by the logarithm of sales and firm size by the the logarithm of assets. Standard errors are clustered at the firm level in column 1 and bootstrapped in columns 2–4. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

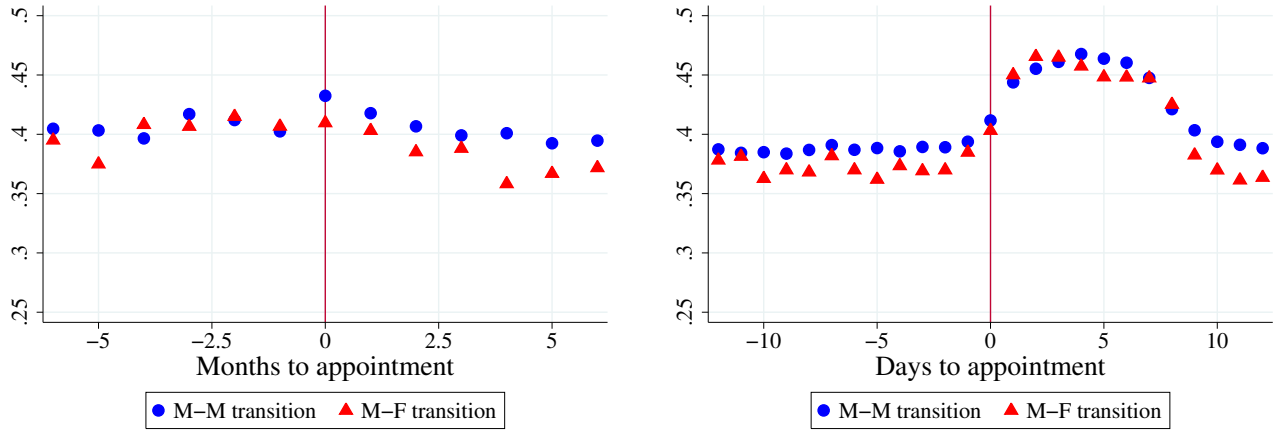
D.2 Assessing differences in prior beliefs

In this section, I check whether there exist any differences in prior beliefs on the ability of male versus female leaders. Given the underrepresentation of women in executive positions, the board may have more dispersed prior beliefs on the managerial ability of women.[21] Understanding the role of uncertainty is particularly important in my setting. First, if firm-level uncertainty increases following the appointment of a female CEO, the value of information to the general public may increase, thus explaining why female top executives are more monitored than their male counterparts. Second, differences in prior beliefs alone can rationalize the higher incidence of turnover measured for female appointments. Bayesian updating implies that the relative weight of new information depends on the precisions of prior information and the signal. For the same level of signal precision, the weight of

[21]Because the dispersion of firm performance is not different across male- and female-led firms, more dispersed prior beliefs on the ability of female CEOs would imply a departure from rational expectations.

new information is larger when prior information is less precise. Therefore, a less precise prior would increase the weight of new information and lead to faster board's learning. Holding everything else constant, faster board's learning would increase the turnover hazard over the first years of tenure for female CEOs relative to their male counterparts. A similar argument would apply to prior public beliefs. The higher the dispersion in prior beliefs, the more the weight of new information provided by news media, which would then increase the incidence of turnover. In order to understand the dispersion in prior beliefs at the start of a female appointment, I check the evolution of (i) firm-level uncertainty and (ii) analysts' beliefs around the appointment of a new CEO, comparing male-to-female transitions to male-to-male transitions. Because data on expectations and volatility are sparse, I can only match 12% of my sample of individual CEOs to data on expectations and volatility. To increase the number of observations, I extend my sample of 3,026 individual CEOs to include CEOs that are also the company's President. As a measure of firm-level uncertainty, I use data on the volatility of firm equity options, calculated by OptionMetrics.[22] I form two portfolios of firms, corresponding to male-to-male and male-to-female transitions, and check the evolution of average monthly volatility of firm equity options around CEO appointment, separately for the two portfolios. The results are plotted in Figure D.1. In the 6 months before the appointment, the two portfolios closely follow each other. Firm-level uncertainty increases slightly in the month of CEO transition, but only for male-to-male appointments. In Appendix Figure D.1, Panel (b), I zoom-in closer and focus on 10-day volatility calculated in each of the 25 days around CEO appointment. CEO appointment increases firm-level uncertainty in both groups of firms, and the two portfolios very closely follow each other.

[22]Option volatility is commonly used in the corporate finance and macroeconomics literature to measure firm-level uncertainty. Two prominent examples include Baker, Bloom, and Davis (2016), and Kelly, Pástor, and Veronesi (2016).



(a) Monthly volatility

(b) Daily volatility

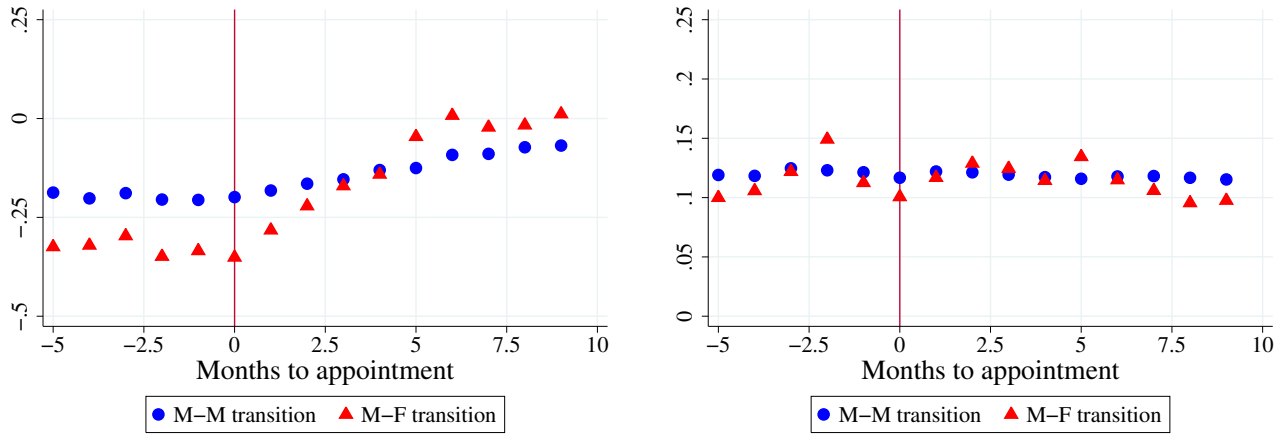
Figure D.1: Volatility of firm equity options around appointment

Notes: (a) Average volatility of firm equity options, measured on the last trading day of the month and calculated in the preceding 30-day horizon. The sample includes 117 male-to-female transitions and 1,817 male-to-male transitions. (b) Average volatility of firm equity options, measured daily and calculated over the preceding 10-day horizon. The red vertical bar corresponds to the day of CEO appointment. The sample includes 89 male-to-female transitions and 1,396 male-to-male transitions.

In order to have a more direct measure of dispersion in beliefs, I use IBES data on analysts' expectations.[23] I match to firms analysts' monthly forecasts of earnings per share (EPS) at a one-year horizon, and form two portfolios of firms, corresponding to male-to-male and male-to-female transitions. In order to proxy for uncertainty in analysts' beliefs, I focus on two measures. First, I calculate the forecast error, defined as the difference between realized EPS and the average forecast. As a second measure, I use the standard deviation of analysts' forecasts. The results are plotted in Figure D.2. Again, I do not detect any significant increase in uncertainty following the appointment of a female CEO. In fact, the average forecast error – overoptimistic before appointment in both portfolios – converges to zero more quickly following the appointment of a female CEO. For male-to-male appointments, the transition is smoother, and I do not detect any deviation from the trend around the month of CEO appointment. In general, Figure D.2 suggests that analysts do not revise their forecasts dramatically following the appointment of a new CEO, and that expectations are highly-path dependent, at least in the short term.[24] Similarly, Figure D.2 shows no evidence of higher disagreement among analysts when evaluating female-led firms: the trend is flat both before and after the appointment, with no significant change in the intercept around the time of CEO appointment.

[23] Such data are becoming increasingly common in recent work in corporate finance. Examples include Ben-David, Graham, and Harvey (2013), Greenwood and Shleifer (2014), Gennaioli, Ma, and Shleifer (2016), Bouchaud, Krueger, Landier, and Thesmar (2019) and Bordalo, Gennaioli, Porta, and Shleifer (2019).

[24] I find similar results when looking at forecasts of long-term earnings growth. On the persistency of forecast errors, see for example Ma et al. (2020).



(a) Average forecast error

(b) Standard deviation

Figure D.2: Analysts' expectations around appointment

Notes: (a) Average forecast error, calculated as the difference between actual EPS and the average forecasted EPS. The forecast period corresponds to one year. The sample includes 53 male-to-female transitions and 1,047 male-to-male transitions. (b) Average standard deviation of analysts' EPS expectations. The forecast period corresponds to one year. The sample includes 53 male-to-female transitions and 1,047 male-to-male transitions.

D.3 Assessing differences in CEO power

As a final test, I check whether female CEOs are less powerful than their male counterparts, or more likely to be appointed following powerful CEOs. If women are systematically appointed following particularly influential or long-tenured leaders, investors' uncertainty regarding the new leadership may arise, even if not due to gender per se. This hypothesis is similar in spirit with the previous one, and is in line with the so called "glass cliff" hypothesis, according to which women and other minorities are more likely to be appointed in particularly difficult or precarious positions. In Table D.2, I focus on my main sample of CEOs and check the characteristics of the current CEO and his or her predecessor, separately by gender. In the first panel, I compare male and female CEOs across firms and show that, on average, female CEOs are not less powerful than their male counterparts. The only significant difference arises when looking at the share of independent board members, as female-led firms tend to have slightly more independent boards. In the second panel, I check how male and female CEOs compare when considering their predecessors: again, I do not find evidence that women are more likely to be appointed following particularly powerful leaders. The results suggest that female CEOs are not less powerful than their male counterparts, and that uncertainty regarding female leadership is unlikely to account for the observed patterns.

Table D.2: CEO power: current CEOs and their predecessors

Current CEO is:	*Female*		*Male*			
	Mean	N	Mean	N	Diff.	p-val.
(a) Current CEO:						
First appointment	0.581	129	0.624	2897	−0.04	0.324
Tenure in company (years)	8.272	101	7.916	2226	0.36	0.673
Founder	0.101	129	0.075	2892	0.03	0.288
Share of indep. board members	0.891	101	0.852	2225	0.04	0.014
Appointment duration (days)	662	118	707	2660	−45	0.531
(b) Predecessor CEO:						
Female	0.514	109	0.015	2389	0.50	0.000
Tenure in company (years)	10.444	95	10.612	2029	−0.17	0.874
Founder	0.138	109	0.128	2387	0.01	0.764
Chair	0.349	109	0.31	2389	0.04	0.392
Share of indep. board members	0.853	95	0.832	2028	0.02	0.234
Appointment duration (days)	1415	109	1463	2388	−48	0.777

Notes: Average characteristics of the current CEO (in Panel a) and average characteristics of the predecessor CEO (Panel B), by gender of the current CEO. *Tenure in the company* refers to the number of years as employee in the appointing company at the time of CEO appointment.